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RIVER BASIN DEVELOPMENT OFFICE

MID-TERM PROJECT EVALUATION

GAMBIA RIVER BASIN DEVELOPMENT PROJECT

PROJECT NO. 625-0012

May 11, 1984

Evaluation Team:

James Osborn, REDSO/WCA Team Leader
Nicolas Sonntag, Environmental Management Consultant/ESSA
Janet Tuthill, Management Consultant/MSI
Dolores Koenig, Anthropologist, American University
Glenn Anders, REDSO/WCA, Engineer

EXECUTIVE SUMMARY

The Gambia River Basin Development Project as authorized in 1981 and since amended grants $14,694 000 to the Gambia River Basin Development Organization (OMVG: Organisation pour la Mise en Valeur du Fleuve Gambie) through September 1986. OMVG receives this assistance on behalf of its four member states (Senegal, The Gambia, Guinea, and its newest member, Guinea Bissau) in the form of technical assistance for river basin planning, elaborate environmental and socio-economic studies being produced under contract by the University of Michigan, and detailed aerial photography and maps contracted for Mark Hurd Aerial Surveys Inc. -- all to create a planning capacity.

The project is now at a mid-point where the maps have been completed and the final drafting of the Michigan report is about to begin. The process of planning in OMVG should soon enter a synthesis/integrative phase which over the next two and a half years will systematically refine and present options for river basin development investments and management to member states and potential donors.

It is widely believed that the Gambia River system presents a great, perhaps the best opportunity for stabilizing and increasing agricultural, especially food production in this drought-stricken area of West Africa.

Realizing its potential through large-scale water control investments and subsequent irrigated rice development, with up-stream hydropower generation, would be costly and perhaps risky. Thus thorough and extensive analysis of environmental, socio-economic and public health factors and a reliable data base are prerequisites to planning and agreements on investments. The question is: has this project produced them and will the professional capacity exist in OMVG to use them through the completion in 1986 of its preinvestment phase?

The Evaluation finds that the quality, timeliness of delivery and utility of the maps and studies will be satisfactory. The maps are more detailed and of a higher quality than originally planned, but this is appropriate and within the allotted budget. For the studies to be completed in their most useful form will require considerable work on the integration of findings from the four more or less independent components on socioeconomics, river resources, wildlife/vegetation and public health. Their presentation and use would be given considerably added value if combined with an integrative exercise and modeling effort involving OMVG and member state officials about a year from now. That should be supervised by an experienced river basin planner and make use also of the results of other studies commissioned by OMVG and an hydrological basin model and certain economic studies to be added through the AID project.

However, the planning operation of OMVG, to which project technical assistance, training and equipment (computers, lab equipment, documentation) are devoted, while developing, has not reached the level of competence and vigor it will require from now on. As establishment of relationships with member state technical agencies and supervision of the major studies comes to an end, missing and additional technical assistance (inter alia, river basin planner, hydrologist, data and documentation management specialists) should be provided and selected special studies undertaken along with the permanent establishment of data, maps and documentation management and some additional training. This should assure that the process of planning -- the systematic consideration of investment alternatives and their costs, benefits and impacts in basinal development -- will proceed as intended so competent decisions on development actions of major importance are taken in the next few years.

In sum, the Evaluation team finds that the project is successful thus far and well managed. Achievement of its purpose -- establishment of an effective planning unit in OMVG -- is both desirable and possible. Events are moving rather quickly in the Basin: negative ones in terms of a declining agricultural economy, and positive ones with respect to government's and donor interest in new development initiatives. Therefore, the Evaluation recommends an intensification of the planning process. This should be enabled by additional project inputs valued at about ten but no more that 15 percent of the current project's cost and a three month extension of the Project Assistance Completion Date.

INTRODUCTION

The Gambia River Basin Development Project (625-0012) was authorized in May 1981 at a budgetary level of $13.4 million. In June 1983, it was amended to add $1.4 million from the Support to Regional Organizations Project (698-0413).

The project is scheduled for completion in September 1986 and finds itself now at roughly a mid-point of actual operations. It is managed in the River Basin Development Office (RBDO) of USAID/Senegal by an AID Officer and a project-financed expatriate deputy project manager (both on a full-time basis) who keep extensive records and are active in hands-on implementation. The project is virtually on schedule and within budget.

The project provides technical assistance to the Gambia River Basin Organization (OMVG) to assist it in its preinvestment phase of river basin planning for Senegal, The Gambia and Guinea. Through large direct AID contracts, it also provides basin-wide environmental and socio-economic studies executed by the University of Michigan and Harza Engineering Company and detailed basin maps derived from aerial photography by Mark Hurd Aerial Surveys, Inc. Therefore to evaluate the project it has been necessary to treat three separate subjects, each large and complex and representing significant AID investments. The project's purpose is to establish an effective planning capacity in OMVG, that is, institutional development of a Planning Unit. But simultaneously, the project supports massive studies and a major mapping exercise, each with its own independent technical, logistic and other challenges and problems.

Thus an evaluation team was assembled with expertise in institution building (Janet Tuthill, consultant), socio-economic data (Dr. Dolores Koenig, consultant), environmental data (Nicholas Sonntag, consultant), and engineering and mapping (Glenn Anders, REDSO/WCA engineer). It was led by Dr. James Osborn, REDSO/WCA, a geographer and Chief of its Project Development Division. The team conducted interviews and document reviews in Banjul and Dakar (see Annexes) and made field observations in the Gambia and Senegal during April, 1984.

It became obvious fairly early that massive information was available and a series of questions concerning efficacy and future progress of the project would arise. The size and ambition of the studies and mapping exercises mean that they are the equivalent of separate, important projects; while the intricasies and importance of development of the planning operation of OMVG represent a major subject in themselves. Accordingly, a rather detailed report has ensued. It is intended to be helpful both in guiding fine-tuning of studies completion and map use and in suggesting ways in which the development of the planning operation over the next two years can be better assisted.

The Report reflects the three-way division of the project, having its first three sections devoted to Evolution of the Project as Institution Building, Execution of the Studies, and Execution of the Maps. These chapters contain specific conclusions on progress and needs for adjustment. A final chapter containing Fundamental Conclusions and Action Recommendations is geared more to the next steps in institutional development that seem necessary for the project to achieve its purpose and for the OMVG to evolve as an effective instrument for the development of the Gambia River Basin. The recommendations are largely positive in nature, as the Evaluation Team has found that the project has been successful so far and, more importantly, that the potential exists in this organization and milieu for a considerable contribution to regional development with continued AID assistance.

The Team wishes to acknowledge the active and cooperative assistance of AID officials, the staff of the OMVG from the High Commissioner downward, and the University of Michigan/Harza Engineering and Mark Hurd groups in the Basin. They spent enormous time and effort providing information, candid views and correctional advice. This large and diverse set of individuals has a common excitement, optimism and confidence about the enterprise which bodes well.

I. Evolution of Project as Institution Building

A. Project Rationale

When the Gambia River Basin Development Project (625-0012) was conceived in 1981, the Organization pour la Mise en Valeur du Fleuve Gambie (OMVG) was in its infancy. AID, seeking to provide assistance to an organization which potentially could be of great benefit to the people of the two riparian states, Senegal and the Gambia, elaborated a project which seeks to enhance the institutional development of the OMVG through a series of specific development components aimed at achieving the purpose of the project: "In conjunction with other donors to establish an effective planning division within the OMVG by December 1985". (Project Paper, Logical Framework, 1981).

The project purpose was selected as an appropriate target based on information available at the time of design. The design itself is well-detailed given that it was almost completely formulated in AID/Washington based on a report prepared by a consultant team in the field. The design followed convential practice of the time concerning key elements of institutional development: technical assistance and training provided at fixed intervals with sufficient overlap to assure and enhance organizational capability.

Certain assumptions were made concerning OMVG and its role which have since been clarified and made more explicit by its governing Council of Ministers. The key question of which organization will control infrastructures which may be built to benefit the river basin is unresolved and the member states prefer waiting until construction plans are more definite to make decisions on infrastructure control and operations. OMVG's influence as a coordinating organization for the river basin will depend on these decisions.

At the present time OMVG is therefore serving an informational function and is still in a preparatory phase which largely involves commissioning and supervising studies to be used by donors and member states in making infrastructure and development scheme decisions. No capital development projects are being implemented through or in conjunction with OMVG. This does not mean, however, that OMVG is not a functional organization. It is performing supervisory tasks concerning engineering, planning and environmental and socio-economic studies which should contribute significantly to eventual decisions made about basin development.

In support of the institutional development of OMVG, assistance was foreseen by AID in the form of support for the creation of a planning unit within the technical division of OMVG to perform important functions in preparing the future direction of the organization. Outputs of technical assistance, trained host country personnel, maps and a large set of environmental and socio-economic studies were proposed to furnish the elements necessary to achieve the purpose of an effective planning unit.

This strategy assumed that creating a unit and providing it with trained people and special technical help would be sufficient under expected conditions to assure OMVG's ability to plan and then implement a development strategy for the basin which adequately takes into account human and natural resource impacts while trying to improve agricultural productivity and achieve food self-sufficiency in the region. The AID project documents, however, do not present a concept or plan for the development of a planning capacity. This has perhaps showed the evolution of the Planning Division - as ad hoc management decisions have been made during a period of preoccupation with overseeing field studies, as will be seen below. But it does mean that the development of the planning process of OMVG is not locked into a rigid structure and set of sequenced activities at present. Thus there is every opportunity for refocusing and enhancing planning activities in light of experience in the project.

The Evaluation, coming at a convenient mid-point in project implementation will show where OMVG stands now as an organization, what majors tasks lie ahead during the project's time period and how AID may be able to contribute more effectively to the development of the institution in light of those tasks.

B. The Development of OMVG

An examination of the current structure and major functions of OMVG at the time of the evaluation will provide a contextual basis for evaluating the current efficacy and future needs of USAID's assistance to the organization.

OMVG has evolved a structure which follows the structural plans put forth in the UNDP sponsored action Plan (1982) and the AID Project Paper (see Figure 1.) (1981). At the present time it is primarily involved in serving as a medium for achievement of the political developmental objectives of the Member States in dealing with each other and as a supervisory agency for the preparation of a number of background studies including those funded by USAID.

The various divisions under the Technical Director perform functions as assigned by him as on an ad hoc basis. But there is no real planning function being carried out although the need for planning current information requirements within the organization persists and may indeed becoming more acute. In time, the decisions regarding choice of infrastructure interventions and accompanying development programs in the basin, will require, as foreseen in the original AID design, a fully-developed planning unit. It should synthesize information and present developmental options and be capable of meeting information requests from the other divisions and the Council of Ministers on technical matters on a regular basis.

At this point, the OMVG is emerging from its skeletal early staffing pattern of two years ago with merely two services - technical and administrative: to one which includes personnel in all divisions except irrigated agriculture. A portion of the planning function is currently being assumed by the Principal Technical Advisor (PTA) provided by UNDP who reports to a higher level in OMVG, usually the High Commissioner directly.

This is an indication that a higher level planning function might indeed be necessary at a level equal to that of the technical director to assist in coordinating the information inputs from each division and to provide the High Commissioner and the Member States' technical committees with information, plans, and analyses scenarios for the development of the basin to be presented to the Council of Ministers. Requests from Technical Committees and the Council itself to the High Commission suggest that these bodies would welcome a higher priority given to the planning function.

The OMVG has been concentrating its supervisory efforts on technical decisions relating to the production of the engineering studies being prepared by European consulting firms and the socio-economic and environmental studies being carried out by the University of Michigan under AID funding. As these studies are being completed during 1984, new demands arise for a revision of the overall Action Plan to be submitted by the member states to the donors as well as for planning to allow OMVG to meet the requirements of the Council of Ministers vis à vis all member states in the Basin.

It is against this background of basic objectives for the organization (see Figure 2) that an assessment of OMVG capabilities and needs must be made. The ability of the organization currently to fulfill its functions must be measured against future resource demands which can be foreseen for the remainder of the life of the AID project. The planning function which the U.S has decided to support in building the OMVG is moving from a basically supervisory mode to one where active analysis, synthesis and recommendations will be required. This in turn suggests changes in project strategy which will be discussed fully below.

The High Commission of OMVG has been asked by the Council of Ministers to give priority to these tasks:(1) revising and updating the Action Plan; (2) integrating the upstream Guinea portion of the basin into its development strategy; (3) seeking coherence between national and regional projects in specific strategy within the basin; (4) testing the production impact of intensification of rainfed agriculture in relation to technology transfer rate increases; and (5) reviewing crop yields in the basin to take into account projected production increases in neighboring zones and river basins.

In addition to these major tasks, OMVG has been asked to seek donor support for interventions in Guinea-Bissau.

Major new functions will begin to gain importance for OMVG in the next two years as an integration of analyses undertaken by donor-funded contractors is initiated to allow Member States to make rational, well-informed decisions about placement and effects of infrastructure, acceptance of change by basin populations and mitigative measures needed to reduce negative health and environmental effects of river basin development.

In the immediate future the revision of the Action Plan, now to be called the "Indicative Plan", will require a significant substantive input by OMVG and donors and a major effort will have to be made by the Planning Division to assess the implication of this plan and its relevance to the findings of the

baseline environmental and socio-economic studies being completed at the same time. These new tasks and added functions require a reassessment of the technical assistance, training and facilities support for the planning division currently being underwritten by AID.

In the next few months, OMVG will focus on the revision of the Action Plan, assisted by UNDP with FAO technical advisors. The principal critiques of the original Action Plan as identified by the subcommittee charged with its evaluation were that:

(1) it contained limited and unbalanced information on different sections of the Basin; (2) there was no comprehensive view of the integrated development of the Basin; (3) there was no development strategy for the Guinean portion of the Basin; (4) the strategies were not prioritized and classified for financing.

It is expected that the Planning Division will be asked to assist in the development of the revised Action Plan during the last half of 1984. Once the University of Michigan completes the environmental and socio-economic studies, the Planning Division will need to assist in the incorporation of the findings into the final draft Action Plan to be submitted to a donors conference anticipated in 1985.

The studies commissioned by OMVG through donor support are expected to contribute to a Master Plan of the Basin to be completed in 1986. This plan will include as its basic elements:

- a complete information picture of the basin;
- a presentation of the role of OMVG and its primary objectives;
- a presentation of identified programs for meeting targets;
- a determination of the complete water resource potential;
- an identification of potential water and energy consumers;
- a scheme for the optimization of complex production/consumption relationships in water/energy; and
- a determination of priority financing needs.

These two major planning exercises, i.e., the intermediate or indicative Action Plan for use by donors and Member States as well as the comprehensive basin Master Plan will require significant amounts of analysis of existing information generated by the basin-wide studies being completed as well as additional analyses needed for specific impact information on infrastructure and implications for agricultural production. The Planning Division will need to play a major role in the elaboration of these plans as well as in assisting the OMVG in disseminating information on the Basin at appropriate times to donors and Member States. This information dissemination and analysis

function requires substantial human resources and time. Some of these resources are currently being provided under current the project, while others will need to be added if the Planning Division is to become functional in the way anticipated during project design and in light of the actual intermediate goals of OMVG.

Support for OMVG itself as an organization would appear to continue to be an important investment for donors in the region, since all the Member States consider it a high political priority and a potential means of real future and present regional cooperation. Regional organizations established around functional objectives such as OMVG may well have a greater possibility of success than those with only cooperative but non-functional aims.

C. Actual Project Implementation

The assistance to OMVG provided by AID directly under this project has focused on technical assistance to the Planning Division, training and provision of maps and studies. The latter will be discussed thoroughly below. The present analysis considers the present state of project implementation in the technical assistance, training and support facilities fields.

Since field implementation began in 1982, a series of timing decisions have been made, particularly in regard to training of member state counterparts, which has reduced the total time projected for the AID-furnished technical assistance to work with them. This decision may have been unavoidable, but as the original design proposed 500 person/months of overlaps and 138 are currently planned, a serious shortfall in the amount of time the socio-economic and environmental groups will have worked together is evident (see Table 1). This timing of training also seriously affects the Planning Division human resource base at the time the studies are completed (early 1985). At that point all counterparts will be in the U.S. for long-term training.

Although the University of Michigan studies were delayed for 9-10 months from the dates planned in the project agreement, it should be noted that counterparts were not named to the Planning Division until shortly before that time. USAID was faced with the decision to send them for training immediately or to wait until the studies were nearing completion.
The latter option was adopted, indicating the high priority assigned to the supervision of the Michigan contract both by OMVG and USAID. In view of the large size of the effort and the management deficiencies on the part of the Contractor, it is not surprising that assisting with logistical, official and technical matters became the number one priority of the Planning Division.

TABLE 1

A. USAID FINANCED LONG-TERM TECHNICAL ASSISTANCE TO OMVG PLANNING DIVISION

Position	START	END	TOTAL PM	Total Overlap Months
Environmentalist	1/82	7/85	42	
Sociologist	7/82	7/85	36	
Economist (1)	10/82	8/83	10	
Economist (2)	6/84	7/86	24	
B. MEMBER STATE COUNTERPARTS SINCE AT OMVG BEFORE TRAINING				
Environmentalist	9/82	9/84	24	36
Sociologist	12/82	7/84	19	24
Economist	11/82	1/84	14	9
River Basin Planner	11/82	9/84	—	
				69 (2) = 138

1. Technical Assistance

The technical assistance responsibilities outlined in the PP emphasize planning activities, on-the-job training for counterparts, preparation of a river basin study plan of work, and preparation of bibliographies of studies relevant to the overall basin. Writing terms of reference for the environmental and socio-economic studies is last place on the list.

The Project Agreement says that long-term technical assistance in building institutional capability for technical planning of implementation activities in the river basin will be provided. The agreement foresees a five year study phase in which planning will have primary importance. Short-term assistance for training in the use of the aerial photography and mapping is also mentioned.

Original assistance plans called for a civil engineer/river basin planner, environmental specialist, rural sociologist and natural resource economist. The river basin planner was not provided, as UNDP offered to fund such a person under their project.

In fact the Principal Technical Advisor supplied works directly with the High Commissioner, not the Planning Division, and is a very experienced transportation analyst and engineer but not a river basin planner, despite many years experience in various river basin projects in Africa and elsewhere.

The lack of a planner responsible for coordinating the technical assistance in the division along with the fact that OMVG has never filled the position of director of that division have probably contributed significantly to the reactive management style in practice there and the lack of overall planning for the OMVG.

Furthermore, since the planner would have a dual role, incorporating planning on one hand and engineering on the other, the omission of this technical assistance was a double handicap for the Planning Division. There is an obvious need for technical analysis of water resources as well. One of the bidders for the River Basin study noted this need: "Our proposed staffing does not include a River Basin Engineer or Hydrologist because we understand that such an individual will ....contract with USAID. We consider this discipline to be mandatory...." The result is a lack of central focus on understanding and analysis of the water resource as an entire system independent of the various specialized studies.

As it stands now, 112 person/months of technical assistance will have been provided by the Project Assistance Completion Date (PACD). These are in the environmental and socio-economic groups. A counterpart for the Principal Technical Advisor, a water resource engineer, has been assigned to the Planning Division but as he has no counterpart in the Planning Division, he is involved primarily in administrative tasks of a kind which could be performed by a less qualified person. His water resources background has not yet been put to any use. Suggestions for this person's training appear in the next section. It is advisable that this person become a fully functioning member of the Planning Division in the future. The Planning Division's staff is indicated below.

Planning Division Staff

Planning Director - Vacant
Sociologist - TA-U.S.
Sociologist - Gambia
Economist - Guinea
Economist - U.S. - Vacant
Rural Development Specialist - Senegal
Water resources engineer - no U.S. counterpart

Environmentalist -TA- U.S
Environmentalist - Senegal

Currently the Planning Division has two persons focused primarily on environmental issues: the environmental technical assistant funded by AID and the OMVG counterpart who is in training to become the OMVG environmentalist after the technical assistance contract is completed. Both individuals appear to be competent, highly motivated and conscientious.

Their frequent visits to the Michigan base of operations in Banjul and participation in a number of the river resource and wildlife field trips has kept them informed of the studies' progress.
Their participation also provides the University of Michigan team with a direct link to OMVG and the member states thereby helping to facilitate contacts between the University of Michigan team and experts in both the host countries and external international agencies.

The environmental technical assistant has been working closely with his counterpart to ensure that he is given every opportunity to learn more regarding the role of the environmentalist within OMVG. Proposed training should take advantage of the counterpart's already extensive knowledge of land-use planning by allowing him to broaden his expertise to other subjects relevant to this future role in OMVG (e.g. systems analysis, river basin management, policy analysis). The AID financed technical assistant is well-qualified for his position and has been particularly effective in expanding OMVG's contacts with Member State personnel through technical committees and regular informal contact. It obvious that he has spent considerable time discussing environmental issues with them along with his counterpart. The environmentalist has expressed the need for technical support in hydrology to analyze proposed changes in the river's regime.

The socio-economic group was staffed by a rural sociologist and a natural resource economist and has a counterpart assigned in each of these categories. The entire economic function is currently vacant, as the counterpart left in January 1984 for long term training and the technical assistance position has been vacant since August 1983. A replacement for this position is currently being recruited and should be fielded by late June, 1984. The original economic technical assistant was asked to resign because of deficiencies in performance of his tasks at OMVG.

The Evaluation Team has found no evidence that OMVG or USAID were incorrect in this determination. As a result, however, a very important position in basin analysis has been vacant. The recognized need to fill this position as soon as possible is supported by OMVG's current task-load and future new emphasis.

The rural development specialist has been assigned to work with the socio-economic group but has been given limited responsibility. This is unfortunate since he is very familiar with development programs in three of the basin member states and could be used very effectively to coordinate OMVG activities with Senegalese socio-economic and development agencies as well as to evaluate the content of proposed action plans. He represents an untapped resource within the Planning Unit. The technical assistance sociologist's reluctance to collaborate with him is not justified by any evidence before the Evaluation Team.

The sociologist assigned as technical assistant to the planning division is academically qualified, but has limited field experience. This may have been a negative factor in the monitoring of the socio-economic studies. He could play a more positive role in the Planning Division by expanding contacts with Member State institutions and adopting a team mode of interaction with colleagues.

The sociologist counterpart shows potential for data base management and has a substantial academic background. The proposed training program in the U.S. can with some minor modifications prepare him for his future role in OMVG. The sociology sector will be vacant as of July 1985 and this deficiency should be planned for by OMVG.

The current state of technical assistance in the Planning Division at OMVG is mixed. The environmental group is strong and apparently effective although it is not yet involved in the kind of impact mitigation planning foreseen in the design and could be further strengthened technically. The socio-economic group is weaker due to the absence of an economist and the under-utilization of the rural development specialist.

The absence of an overall coordinator in the form of a river basin planner and a Planning Division Director counterpart has contributed to a very reactive management style and a less effective division. The new functions to be assumed by OMVG and the pressing need for planning will dictate some adjustments of present levels and mixes of technical assistance. These will be discussed in section D., below.

2. Training

The Project Agreement calls for four member state counterparts to spend one year in academic training at the Master's level, return to OMVG to participate in the studies, then return to the U.S. to write a thesis on a topic from the basin studies data, and then take up a permanent position at OMVG.

The counterparts, however, were not named in time to do one year of course work before the basin-wide studies began; so it was decided to postpone their departures until the studies were nearing completion. The original plan did not allow language training time for the francophone counterparts (three out of the four selected). The present training plans will bring counterparts back to OMVG by early 1986, but not all participants will have completed their degree by then. (See table 2.) Based on the current plan, some adjustments may need to be made in PIO/PS or the PACD to assure completion before the end of the project.

An alternate plan would be to have both Messrs Samba and Dibba complete 18 months of training (academic plus research) and have a thesis topic selected from within the data base generated by the studies before they return to OMVG. This topic would serve an OMVG analysis need and at the same time be accepted for theses or dissertation in the U.S. The participants would return to OMVG to write thesis with one-half their time allotted to this work to assure timely completion. A final trip to U.S. for defense of the thesis should be funded.

Both Messrs. Kourouma and Bah would be trained further subject to successful completion of English training and prerequisite courses. Careful supervision by OMVG staff and coordination with USAID will be needed to assure completion of studies before the PACD. Participants must be made aware that any delay on their part in the U.S. will jeopardize their ability to finish before the allotted time and funds expire.

Mr. Bah should develop his background in water management by pursuing graduate level study in hydrology and water resources engineering. An understanding of the hydrology is an acknowledged need in the Planning Division and Mr. Bah should have the opportunity to continue specializing in water resources. A MSC. program of study would be appropriate after successful completion of English training and prerequisite technical coursework. If possible, both Messrs. Samba and Dibba should return during 1985 to work a few months at OMVG to become familiar with the data base management.

The Project Agreement called for a junior statistician from a Member State to be trained at OMVG in data collection or statistics. As discussed in the next section, it would be preferable for the documentalist to receive this training on-the-job from the data base management specialist assisting the planning division. The original plan was for various member state personnel to receive data processing training and on-the-job training with the studies contractors. As this was never formally elaborated in the Project Agreement, although called for in the PP, it was left to Mark Hurd(see Section III, below), the University of Michigan and USAID project management to try to meet member state expectations in this regard.

Problems arose because of lack of clear guidelines and objectives for the training (see tables 3 and 4 for actual positions, etc.). Only one Michigan team, river resources, managed to train a full complement of six persons. This was largely due to extra efforts on the part of the OMVG environmental group to get member states to name trainees. The Wildlife/Vegetation team had only one trainee and Socio-economic had four although this team had 23 enumerators and seven supervisors trained in field data collection methods. No training was provided by the Public Health team.

3. Use of Studies and Maps

So far the MarkHurd aerial photography provided by AID has been used for land use information for the UM/Harza study forester and to make some engineering decisions relative to one of the dam sites. The use of the socio-economic and environmental studies as baseline data set for the OMVG and the member states may well depend on action taken by donors and OMVG in the next year. Certain steps must be taken to enable OMVG to use the information effectively. These include: (1) deciding on scenarios and options for developing the basin; (2) deciding what kinds of information are needed to mitigate actions; and (3) designing a data base and establishing monitoring criteria. The Planning Division will also need to undertake some special tasks and activities, recruit additional member state and technical assistance personnel, and assist in the development of the Documentation Centre, environmental monitory laboratory and map storage facility (see section D below).

4. Project Management

Output and input delivery management of the project has been good despite some delays in contractor selection. The present RBDO project management team (an AID officer and a project manager provided by contract under the project) keeps excellent project implementation records, has an innovative and practical procurement tracking system and has up to date, accurate financial management information. Their procurement system, for instance, will greatly facilitate inventorying of equipment to be transferred to OMVG by the University of Michigan.

Problems in overall performance of the Planning Division at OMVG can largely be attributed to the lack of a chief of party or director to coordinate planning for the functions of the unit. The AID officer should not have to do this, nor is it possible for him to perform this function. That vacuum has created problems which must be overcome if the Planning Division is to assume its full functions for the rest of the project.

USAID should have maintained closer contact with UNDP in order to share information and some decision-making. This can be remedied in the future end already appears to have improved during the course of the evaluation exercise.

It should be noted in reference to the University of Michigan that a contract of this size (over 1500 person-months of field activity) requires very large amounts of supervision and that much of this has been done by the two-person project management team in Dakar. They have had to undertake a large amount of problem-solving tasks due to the University of Michigan's less than fully autonomous ability to manage its field operations -- a problem that is probably due to a lack of management staff in the Banjul headquarters and of an expediter/logistician in Dakar. The OMVG technical assistance staff funded by AID, and the central project managers have spent too much time on logistical support matters, to the detriment of higher functions such as donor and member state consultation and planning for the use of the Michigan studies. The completion of the Michigan studies should allow the project management team to devote more time to work with OMVG and the Planning Division where their talents and planning skills could be sources of guidance to the technical assistance team.

5. Observations on Institutional Development

This project brings to light some important lessons in institutional development, inter alia that:

- a mix of technical assistance and training alone does not build institutional capacity;
- ability to handle new functions grows with practice and group task-solving, not in isolation;
- a conscious and carefully timed plan for developing an institution is necessary to achieve objectives;
- institutions should be carefully monitored for changes in objectives and focus which affect the technical assistance specialty mix; and
- some activities have to be so carefully synchronized (technical assistance overlap with counterparts to be trained, for example) that one change may precipitate a host of others and should be examined closely.

D. Project Adjustments needed

The present state of the organization at OMVG coupled with the new tasks and functions which it will assume in the next few years necessitates some re-adjustement of the project strategy originally planned in the PP.

While the purpose to "create an effective Planning Division with adequate analytical data to enable OMVG to be an effective operating agency for coordination and management of development planning and project implementation " (Pro Ag, Annex 1) should remain the project purpose, it should be understood that the nature of OMVG as an organization is changing. Over the next two years it will be important to monitor certain key decisions which the member states will be making through the Council of Ministers. The funding climate projected by the donor community will also play a subtle but effective role in guiding decisions about the basin.

The admittance of Guinea Bissau, for instance, may necessitate the development of more interest in rainfed agriculture and could further encourage the development in OMVG of what may in effect become a more general technical consulting service facility.

USAID should in particular monitor these types of organizational change:

-changes in the role of technical direction in relationship to Member State committees.

-increases in contact between the planning and other divisions in OMVG.

-requests from member state Ministries and research groups for information from OMVG about the basin.

-responsiveness of member states to budget requests from OMVG.

-responsiveness of member states in filling positions made available at OMVG.

-rate of retention of OMVG personnel trained abroad by donors.

-changes in mandates and tasks from Council of Ministers away from planning to implementing development projects.

Based on present evidence, it cannot be assumed that OMVG will manage infrastructure in the basin. It currently provides an important forum for member states to make policy statements linking each other regionally, to voice concern on improving the lives of people in the basin, and to share information and attract the attention of the international donor agencies.

For AID to support OMVG in its important information gathering and synthesizing tasks, and for these to the successful, it will have to increase its level of assistance to the Planning Division as its main target within OMVG. Current levels of assistance are insufficient and certain planned outputs have never materialized. This added support has implications for technical assistance/management staff development and use of studies, training, and facilities development.

1. Technical Assistance

The technical assistance component is already being improved by the recruitment of an economist to fill the vacant position for 24 months beginning in the summer of 1984. Some short-term assistance is also called for under this contract, but levels and specialty mixes may have to be increased to assist the planning unit effectively until PACD. The Evaluation Team's findings thus support the Salinger report and the AID PIO/T calling for services by the economist in the next two years.

The first task of the economist, however, should be to make sure that adequate consultation is occurring with environmental, sociological and infrastructure groups at OMVG on issues affecting economic policy, investment and project planning by member states and donors. Regional marketing, pricing and similar issues, though important, should be a secondary concern in the next year or so.

A river basin planner should be recruited as soon as possible for two years (extending PACD, if necessary). This person's primary responsibility should be to provide guidance to the OMVG and to agencies of the member states in procedures for integrating and synthesizing basin-wide data and formulating development plans, at both the basin and project levels. Along with a counterpart who will be Planning Division Chief, the river basin planner should be responsible for coordinating Planning Division activities and ensuring that the division is performing tasks which help OMVG plan its activities and anticipate decision-making needs of the member states by closely coordinating with the High Commissioner.

An hydrologist should be recruited for the Planning Division and provide technical input to environmental and infrastructure decisions. Limited computer models have been developed for the feasibility study of the different dams, such as ROSS for the Kreketi study. Yet, no complete hydrological model exists that includes and links all reaches of the river. A general mathematical model of the river is fundamental to the rational assessment of various development options. The OMVG must have the independent capability to quantify and evaluate effects of water resource schemes. An hydrologist with resources experiences and modeling skills would fulfill this need. Using the OMVG's IBM-PC computer, the hydrologist's sole task would be to process all the hydrological information existing on the river system and adapt a program to determine the effects and interactions of various proposals for storage, stage and discharge regulation and water budgets.

A data base management specialist should be given a one year contract to set up a data management function in conjunction with the documentation center. This person should train the documentalist to access the information which will be stored on a micro-computer retrieval system and to use the seven microcomputers which will be placed in OMVG. He/she should also train the laboratory technicians in data access techniques.

Additional short-term technical assistance is planned for in agricultural economies (four months), resource economics (two months), environmental planning (four months). This should be increased to include a management/planning specialist, Public Health specialist and other disciplines as identified by the Planning Unit in the course of objectives-setting exercises.

2. Staff Development and Use of Studies

The University of Michigan final report will be a unique multidisciplinary document that will represent the first truly integrated assessment of a river resource system in Africa. Many aspects of the biological, physical, and social systems will have been addressed and a series of recommendations regarding monitoring and mitigation will be put forward. It is critical to realize however that such a study, complete with all its predictions and recommendations, is only the beginning (albeit a good beginning) of the long-term process of planning, managing, and monitoring the basin effectively and efficiently. To accomplish this task what is needed is an integrated strategy that permits overall evaluation of all the key sectors (hydroelectric power, agriculture, fisheries, wildlife, socio-economics, health) to ensure that decisions are well informed and cognizant of the tradeoffs that are being made.

Development of such a strategy is not an easy task. It will take time and will require input from a wide range of institutions both national and international. Most important of all it must maintain a high degree of flexibility. The Gambia River Basin is a complex system around which there will always be considerable uncertainty regarding its response to change. This in combination with the national interests of each of the member states in OMVG and the inclinations of the donor organizations makes it essential that the developed strategy be adaptive and responsive to the changing priorities for the basin.

The completion of the Michigan study represents an ideal opportunity for OMVG to initiate the structuring of such a strategy. An initial integrated understanding of the basin's biophysical system is available, the feasibility studies for the various proposed projects are completed, an hydrological model can be provided, and there is a need to put together the revised action plan, or indicative plan, for presentation to donors in 1985.

Development of the strategy is the logical function of a Planning Unit working closely with the Technical Director and the High Commissioner. With the added expertise of a resident river basin planner, economist, hydrologist, and data management specialist as well as short-term expertise, this team should be able to assist greatly in the strategic planning exercise . There are a number of features that should be established as part of the strategic exercise:

(a) The strategic plan should not be developed in isolation. A blend of scientific experts, managers, and policy people from each of the member nations should be given every opportunity to contribute. This ensures relevance to all those concerned and eliminates the counterproductive suspicion that develops if key players are not involved from the outset.

(b) Simulation modelling should be used to help integrate the system and evaluate the range of feasible policy options.

(c) The structure of the modelling analysis and its products should be expressed in other communication formats (e.g.slide tape productions, video, executive summaries) to ensure understanding and support from the broader audience (e.g. the public, managers, decision makers, donors) that were not involved in the analysis.

(d) All the component parts of the Gambia River system (e.g. economics, hydrology, agriculture, fisheries, socio-economics, health) must be integrated to encompass all the linkages and feedbacks in the system. The results can then be used to structure the constants imposed on each component analysis so that they respond to the policy needs at a relevant level of detail.

(e) The analysis should be structured around specification, first of all, of the activities being considered in the basin, and second, of the key indicators, or valued ecosystem components, that are used by decision makers to evaluate the ability of a policy to achieve different objectives (economic return, rice production, fish harvest, power generated, per capita income, etc.) By structuring the analysis around actions and indicators, the questions of strategy are given policy decision and the areas of conflict between agencies are minimized.

One methodology for accomplishing the above that has been applied to a number of resource management problems over the last decade and which should be explored as a tool to be provided under the project is Adaptive Environmental Assessment and Management (AEAM). This involves consultants, OMVG staff, and member state technical and decision-making officials off and on over several months, with workshops and modeling resulting in refined analysis of developmental options and a set of computer tools and audio-visual presentations useful for later decision-making.

A documentation center for the Planning Unit is also definitely needed to support the above and as a general tool. The first order of business in its development is the assignment of a member state specialist to be responsible. Next a series of meetings should be held to define what its role within the OMVG organization (and to the member states) should be. This would include what kind of documentation would be held, how it would be accessed and used, where it should be, how it will operate. Next a decision must be made on how to store and retrieve information - should it be computer based or an alternate, microfiche vs. documents, relationship to other libraries, etc.

A function of the documentation center must also be the storage and accessibility of the extensive set of aerial photographs and photomaps produced by the project. This will require short-term technical assistance, as well as equipment and should be combined with training. Technical assistance to the documentation center concerning both documents and maps should be provided by short-term consultants at regular intervals over the first year of operation.

The Michigan exercise has provided expensive and useful environmental monitory equipment which will become the property of OMVG. At some point it should be used. The placement, content and operation of the environmental monitoring laboratory has been provided to USAID in the Falter report.

A lab facility oriented towards basin monitoring and research support would be viable and a good idea if certain conditions are met:

(a) enough technical and support staff can be found to maintain the lab's function, credibility, and operational capability. This must include expertise capable of maintaining all the equipment (boats, trucks, instruments, engines, etc,) complete with a workable inventory of spare parts.

(b) an experienced manager can be provided to operate and administer the facility.

(c) a source of long-term funding is available to maintain the facility and augment funds required to operate the basin monitoring plan; and

(d) all the member nations support the need for such a facility in both substantive and monetary terms.

3. Additional Training

Two additional years of training will need to be added beyond that already planned for in the project to provide both language and technical training to two counterparts.

In-service seminars in-Country by local management and planning institutions should be explored to help build planning skills within OMVG.

Training in map storage, access and interpretation for OMVG and member state personnel should also be provided.

II. Execution of UM Studies

A. Introduction

For the OMVG planning unit to become effective, it needs to have information on which to base its activities. Therefore the second major part of the project is a series of socio-economic and environmental studies "to provide the planning unit with the skills and data it will need to carry out its task" (UM Contract: 1). The studies are in general focused around one major issue and its consequences: the environmental and socio-economic impacts of the construction of the various dams proposed by OMVG. The studies should not only discuss what these impacts may be, but should also propose mitigative measures for the negative ones. Rarely, if ever is the need to suggest ways to enhance positive impacts mentioned. The various Socio-economic and environmental studies should not simply stand as separate studies, but should be compatible and integrated into one final report which analyses and explores tradeoffs among different environmental and socio-economic objectives.

Despite this integrated view of the studies, there is a clear division in the PP into four separate studies: socio-economic on the one hand and on the other, environmental, which is clearly divided into 3 components: river resources, public health and Wildlife-Vegetation. Each of these four components has its own team and its own budget. This division is reflected in the proposals, the contract, and the present organization of the project.

The contract for the studies was given to the University of Michigan (UM) in conjunction with Harza Engineering at a cost $4,677,400 ; UM staffed most of the teams, while Harza provided the Wildlife-Vegetation team and some specialized short term technical assistance (e.g. hydrologist, soil scientist). The initial contract, signed October 1982, was primarily for studies in Senegal and Gambia, the original members of the OMVG. But as Guinea was in the process of becoming a member at this time, additional studies were anticipated once Guinea formally became a member. Almost a year later September 1983) the "Guinea Amendment" was signed, providing the contractor with an additional $1,299,578 to expand the studies into Guinea. Since then, Guinea-Bissau has also joined the OMVG. Although the OMVG itself will expand its activities there, the UM-Harza studies will not be done in Bissau.

All studies including those provided for by the Guinea Amendment, are due to finish by the fall of 1984. An integrated draft report, in English and French, is scheduled for December 1, 1984. This will be reviewed by AID, OMVG and the Member States. Upon receipt of their comments, UM-Harza will provide a final integrated report by June 30, 1985.

Because the studies were of such a large scale, and because the final study plans were to be done with OMVG involvement, the proposals suggested only broad outlines for the studies. The first major task under the contract was the establishment of a final Workplan by April 1983. This was done by March 1983 (Working Document No.4) and actual implementation of the studies began soon afterwards, following review and approval by OMVG and USAID.

A project headquarters was established in Banjul in February, 1983, where all teams except the socio-economic one were based. In addition to the four distinct teams (each with its own team leader and staff) there was an overall project direction, headed by the Chief of Party (Karl Lagler) and including an administrative manager (Song Omkar) as well as many local support staff. The socio-economic team was originally based in Tambacounda, Senegal, but since September 1983, has also been headquartered in Banjul.

There is also a Project Director in Michigan, as well as administration and backstopping capability there; these are all part-time positions filled by CRED Staff. The Project Director was originally to be Kenneth Shapiro (CRED director) who left CRED very early in the project; after a short hiatus he was replaced by economist Elon Gilbert, the present Project Director. Gilbert makes regular trips to Senegambia to aid in project implementation and will play a major role in composition of the final, integrated report.

Two other small additions were made to the original contract for a trainee program and for data processing. Although OMVG wanted a program to introduce member-state nationals to some of the skills used in the studies, there were insufficient funds in the contract to do this. AID arranged directly to pay a part of this funding, while the UM-Harza contract also contributes a part. The original contract also greatly underestimate the resources necessary to do adequate data processing; amendment was added for $62,062 to the UM-Harza contract to increase the amount available for this task.

The rest of this Chapter discusses each of the four studies in turn: its goals, accomplishments, problems and suggested recommendations for improvement. The four studies are presented in descending order of size and complexity: Socio-Economic, River Resources, Wildlife/Vegetation, and Public Health. In a concluding section, the relationships among the different studies are explored as well as some issues which concern the whole set of studies.

On the whole, the four studies represent a tremendous undertaking to be accomplished, in somewhat difficult circumstances, in a short time. Some imperfection and lack of completeness were to be expected and, as will be seen below, can now be pinpointed and perhaps ameliorated before final report presentation. The many problems of managing such an enormous enterprise -- over 1500 person months of field investigations and a total cost of almost $6 million -- have to a large degree been met and overcome, despite what in retrospect can be seen as an under-planned and budgeted management component and an overly ambitious time schedule.

II. B. Socio-economic Studies

1.0. Introduction

The socio-economic studies are one of the four sets of studies undertaken by the University of Michigan. The goal of these studies is two-fold: first, to understand the direct impacts of dam construction on the region; and secondly, to look at one particular dam-related intervention (irrigated agriculture) and assess its impacts and potential role in the region.

The question of socio-economic impacts is quite complex, and in order to address it adequately, the form of the socio-economic studies is accordingly, also quite complex. As stated in the University of Michigan Workplan, this project "provides complementarity of methodologies, several differing scales and intensities of analysis, and the capability to examine critical issues through time, in both qualitative and quantitative ways, using data generated from each approach" (Working Document No. 4: 12).

In light of this complex procedure, this section on the Socio-economic studies begins with a detailed description of its different components. The description is then followed by an examination of how the different components are integrated and the value of these studies to OMVG. Each section makes specific recommendations, which are in turn summarized in a concluding section.

2.0. Plan of Studies

The socio-economic studies involve three basic sets of studies done by a team of approximately 50 individuals, many of whom work on more than one set of studies. The three basic teams are: (a) the basin-wide survey (BWS); (b) the thematic case studies, and (c) the intensive village studies (IVS). There is also an overall support staff in Banjul, including team leadership, which will be discussed separately. The basic structure of the studies and staffing patterns is shown graphically in Figure No. 1, Organigram of the University of Michigan Socio-economic team. Figures No. 2 and No. 3 expand particular parts of the organigram, the intensive village studies and the thematic case studies, respectively.

2.1 The Basin-wide Study(BWS)

2.1.1. Overview

The goal of the basin-wide studies (BWS) is to provide an overall description of the major production systems of the Gambia River Basin. These zones are being distinguished by a combination of criteria, including rainfall, major soil types, the combination of upland and riverine agriculture, and the degree of saltiness of available river water. The purpose of the zoning is to facilitate planning. Each zone may also be the target of specific development interventions which make use of its own particular set of resources and production strategies.

The BWS research strategy is to include a combination of original and documentary research. Since certain of these zones had already been the subject of much previous research (e.g., the Sine-Saloum, and certain parts of the Gambia), it was needless to duplicate effort when the information was already available. Other areas of the region, however, e.g. parts of Senegal Oriental, were much less well covered, and original BWS research was necessary in this area. Finally, certain information on all regions is to be found in documents available from the respective governments and this can be integrated as background information for all the zones.

The original research part of the BWS is done through the administration of one long questionnaire done by a team containing both senior researchers and translators. The survey as a whole takes about 12 hours to administer, over two days. The team enters a village in the late afternoon or early evening and discusses the study with the village chief (and/or alkali) and elders. The team then breaks up into discussion groups with villagers and goes through different parts of the questionnaire. After breaking for the night, the teams then reassemble with different groups the following morning and finish the questionnaire.

The questionnaire as now constructed represents a version much shorter than the original version which took two to three times longer. The original version contained questions on agriculture, livestock, and the use of fish, wildlife and forestry resources. When it became clear that the length of the document had to be decreased, it was decided to delete those questions that had to do primarily with natural resource use and livestock and keep in only those questions that had to do with agriculture, especially questions on irrigated agriculture. This bias to agriculture has caused several problems, to be discussed below.

The choice of the villages to sample has not been done in a formal fashion. Rather, preliminary zones were delineated and after a determination of major ethnic groups and production strategies in them, villages were chosen to reflect these. The team would interview several villages, and, as they began to get essentially similar information (i.e. little variation) they would go on to another zone. This informal sampling means that the BWS sample does not conform to formal criteria of random selection. Instead, the sample is biased towards those zones where adequate information does not yet exist. Secondly, villages have been chosen on the basis of the fact that they seemed representative, in light of information already available on the region. While the team itself believes that the villages chosen are in fact representative in some general sense, the BWS does not cover a statistically representative set of all villages in each of the major regions. Although this aspect of BWS sampling must be recognized, it should not be a major problem; it is difficult, if not impossible to sample formally villages in the rural African milieu. In fact, the sampling strategy shows a kind of intellectual flexibility that is very important in this kind of research as well as the ability to change the initial framework in light of findings that indicate its inaccuracy. The nature of the sample however should be discussed thoroughly in the final BWS report.

The core of the BWS team are Franklyn Casey, project economist, and Cynthia Moore, also responsible for the Senegal irrigation studies. They were aided in conceptualization, original questionnaire design, and in some of the interviewing and analysis by Richard Swanson, a short term consultant brought in earlier by the U.M. These people worked closely with Maguete Ndiaye, the counterpart Senegalese trainee and were also aided by the local enumerators who have acted as translaters in the villages. There is no permanent staff of specific BWS enumerators.

As both Casey and Moore have other responsibilities, (e.g. IVS supervision, thematic studies), there has not been a specific block of time for this project, and it has had to be combined with some of the other work that they are doing. Therefore the state of progress of the BWS is less clear than that of some of the other parts of the study, where the primary researcher has only one task. At this point the actual survey has been carried out in 22 villages in Senegal, and 11 in Gambia. It is planned that the survey will also be carried out in Guinea, but the time frame and the actual number of villages to be covered are still unclear. It is anticipated that the BWS as a whole will not be completed until the end of December, but the major zone (known provisionally as Zone 3 and including villages within a 10 km distance of a permanent freshwater river or tributary) has already been written up (Working Document No. 22, January 1984) and is available to the socio-economic team.

2.1.2. Accomplishments and Problems

Despite the above caveats about the nature of the sample, the research strategy is adequate to achieve the goal of the BWS: to provide an overall description of the major regions of agricultural production in the Gambia river basin. The questionnaires are sufficient to determine the basic aspects of agricultural production and the combination of the original research with documentary information should provide the overall contextual description of extant production systems that is wanted. Although the research strategy is fine, some potential problems have arisen which concern the the ability of the team to produce the necessary documents within the overall time frame foreseen for the achievement of the socio-economic studies.

These problems are the following:

(a) The first problem is on the level of conceptualization. Production systems are more than simply farming systems. Yet when the BWS was shortened, natural resource related activities (i.e., wildlife, forestry, livestock) were selectively deleted in favor of retaining questions related to farming. This has led to a survey which can delineate the impacts of dam construction on farming, but not on the other aspects of the production system. As will be noted below, this is a problem which extends to all aspects of the study. It is worse however for the BWS because of a second change from the original plan. According to the original work plan, it was foreseen that subsequent surveys would be done as needed, to complement the original information (Working Document No. 4: 38). Yet at present the BWS is conceived of as one single village visit, without subsequent visits.

Certainly it would have been possible earlier to schedule subsequent visits to the original BWS villages for a second round, focused on the issues of livestock and natural resource use. Now however, due to understaffing of the BWS (i.e. other commitments of the core team plus no specific enumerators for the team), it probably cannot be done. Thus it is likely that the question of natural resources use will need to be addressed some other way, this will be discussed below in section 4. below.

(b) A second problem relates to the overall research strategy which foresaw the integration of documentary and original research in the description of these production zones. This attempt to avoid duplication of already existing efforts is quite laudable, but the result has been that the team has concentrated much more on the original research rather than on the documentary part. Thus the BWS report risks being one which describes in detail only those zones where original research has been done, leaving to the reader (the OMVG) to go back and do the original bibliographic research, or at least to do the integration. This has two causes. First is the difficulty in the BWS team gaining the documents necessary to do the integration. Secondly, the BWS team has so many tasks to finish before the end of the project that the documentary research risks being left to last, when it will either be left undone, or will be done in a superficial manner.

These two problems can be easily dealt with. The OMVG should be formally asked officially to obtain any documents needed, based on a list provided by the BWS team. If necessary, AID should be requested to assist in this matter.

Once the documentation is available however, there is still the question of who will have time to read and analyze it. While it would of course be best if the core BWS team had time to do this, this is unrealistic. A possible alternative is based on something already begun by UM. They have hired someone at Michigan to do a preliminary annotated bibliography of material on the Gambia River Basin available in the U.S. This person has been requested by the socio-economic team leader to come to Gambia and to do a similar paper on the materials available in the Socio-economic team library in Banjul. The contract for this person could be extended approximately two months to allow her to do more than a simple annotated bibliography. Rather she could write a series of short syntheses of the material oriented around a series of issues where information is needed by the socio-economic team. In particular, for the BWS, she could be given a map of the preliminary zones, told which zones are covered by documentary evidence, and she would write the drafts of the sections on those zones. While the socio-economic team would perhaps have other needs in other portions of the project, one of the primary needs for analysis of documentary materials exists at the level of the BWS. The presence of this person would also help deal with the third problem, timing of the report.

(c) Timing: the team foresees delivery of their final report around the end of December 1984, too late for inclusion in the first draft report, planned for November 1984. This is a serious problem, as it has been foreseen that the BWS will form a kind of first chapter for the total socio-economic report, setting a context for the more detailed studies to follow. It is hoped that the use of the extra person suggested above to do the documentary part of the study will allow work on the BWS to proceed at a more rapid rate. In order to be integrated into the final report, the Senegambia portion of the BWS should be ready at least in draft form by September 30, 1984. Note however that the BWS ought to appear in two parts; one on the Senegambia and a later one on Guinea. The Guinea portion will appear later, as part of the whole Guinea socio-economic study.

(d) The final problem posed to the BWS and all the socio-economic studies, is the integration of the Guinea data. As in the case of natural resource information, this is a problem that concerns all the studies not just the BWS. Thus it will be discussed in Section 4.0. below.

The above problems are not serious , and it is likely that they can be solved if the steps outlined above are taken. If so, it is expected that the BWS will in fact produce a document which can give a general background to the question of agricultural production zones in the basin and the potential of these zones for irrigated agriculture.

2.2. The Thematic Case Studies

The second major studies component is a series of thematic case studies. These focus on a number of topics that are related to the question of dam and irrigation impacts. In all, nine thematic case studies will be produced. While most of those in the Senegambia are well underway, those for Guinea have barely begun. The major topics of the thematic case studies are the impacts of the planned dams, irrigation (including an assessment of extension organizations for irrigation projects), migration, marketing and health. The following section outlines each one of these studies, its basic methodology and the personnel carrying it out, as well as the expected date of the report.

2.2.1. Dam Impacts - Kekreti, Senegal. A draft of this report, done by Walter West, was submitted in early April, 1984. The study concerned the potential relocation of villagers displaced by the construction of the proposed dam and focused on the demography and agriculture of the region. Based on a sample of villages in the region and done by West with the aid of a team of interviewers, the draft is a comprehensive and detailed description. In general, the report could benefit from more analysis in addition to the detailed description, but UM is well aware of this and it is a good piece of work for what is an early draft.

2.2.2. Dam Impacts - Balingo anti-salinity barrage, Gambia. This study, being done by Judith Carney, is expected in draft form by May, 1984. Her methodology is more holistic than that of West. The study is based partially on an extensive review of the available literature, supplemented by extensive interviews in villages of the region.

A more formal questionnaire was developed and systematically administered in a small sample (10-11 villages). This is being analyzed primarily in qualitative terms. Carney, being a geographer, is also doing some work with aerial photographs and maps of the region, and hopes to look at changing patterns of land use over the last 40 years. The report will focus more on agriculture and less on resettlement than did the Kekreti document, so the two dam impact studies will not be directly comparable. The scope of the report may be somewhat narrower than initially planned, because the time for the study was reduced from 12 months (Work Plan: 30) to the seven Carney actually spent. However the Balingo report from UM will be complemented by an EEC/LRDC Study in this same region monitored by the agricultural research division of OMVG.

These two studies directly concern the question of reservoir impacts, and because they will both be available at an early stage they should provide a very valuable beginning for conceptualization of the final socio-economic report.

2.2.3. Irrigation - Gambia. This study, being done by Christine Scharffenberger (with the aid of the IVS supervisors) also combines several different types of information. However it is being done on a much larger scale than the other studies. First of all, reports have been collected on some 320 irrigation schemes done in the Gambia since 1980 (for the last seven cropping seasons, with potential double cropping); some variables for each of these will be entered on the computer and some simple analyses run. Although the sample is large, the information on each perimeter is quite restricted, and is also quite variable in both quantity and quality. Therefore, in order to get more complete and reliable information on the different perimeters, a sample of some 30-40 operating perimeters is being investigated, using a longer questionnaire. This information will also be computerized. Again there is an attempt not to duplicate previous work and the sample will not include either World Bank perimeters, about which a report has recently appeared, or LRDC perimeters, about which a report will soon appear. Finally, to understand better the technical aspects of perimeters, a soil scientist will be on the study for three weeks in May and an irrigation engineer for approximately one month in June.

Analysis will include integration of the documentary and original research data, but will be primarily quantitative . The actual form of the analysis is not yet decided, but likely will include some simple descriptive statistics and a linear programming model. Scharffenberger will collaborate with the data processing expert and the economist in analysis.

The report is foreseen for the end of September, with the interviewing done by the end of June. The major problem that exists for this study is its scope. It is very ambitious, and relies on one researcher to integrate data from a wide variety of sources.In addition to the fact that the actual pulling together of the report will require quite a lot of work from the major researcher (who is also supervising one part of the IVS), she will also be dependent on a certain amount of major input from the computer programmer and the economist at exactly the same time that they will have to do major work on the IVS. Although not impossible, this will be difficult.

The project director is aware of this problem and may do something to cut down the scope of the project. This is another situation where someone who could read and summarize the documentary evidence (in particular the World Bank and LRDC reports) would be quite useful. This study is crucially important for an understanding of existing problems of irrigation projects in the region, and it is imperative that a draft be done by early September, so that it can be included in a final SE team report.

2.2.4. Irrigation - Senegal. Although at a conceptual level this study can be seen as similar to the one in Gambia, the scale of irrigation in the Senegal part of the basin is altogether of a different order of magnitude, i.e., very much smaller. In all of Senegal Oriental, there are perhaps 30 irrigated perimeters. The sample chosen is small, 9 perimeters, but reflects the major organizations doing these (SODEFITEX and OFADEC), as well as the major geographical distribution . This sample comprises approximately 1/3 of all the irrigated perimeters in the region.

Since the study is so small, it is being done primarily by one person, Cynthia Moore, with help from enumerators and the Senegalese trainee, Ndiaye. It is based primarily on original research in these villagers, and will be supplemented by information from the IVS in three of the nine villages so that more intensive information on labor and other inputs will be available. Seven of the perimeters have already been investigated, and background information on the extension programs and policies of SODEFITEX and OFADEC has already been written up. Although there is some hope of integrating this information into the larger linear programming model that will be done for the Basin, it is likely that due to the size of the sample, most of the analysis will be much more qualitative in orientation.

The major problem confronting this study is one of timing. Because, it seems, of the desire to include information from the IVS, the timing of the final report has been delayed until the end of October, too late for inclusion in the overall final report in an easy fashion. This also makes comparison with the Gambian part of the irrigation study before integration in the final socio-economic report difficult. Although it is true that Moore has a very complicated and busy schedule because of her duties on a number of different projects, the delivery of a draft on the Senegal irrigation work should occur at an earlier date than now planned even if this draft does not include the final IVS information.

According to Moore's schedule, she hopes to finish interviewing the last villages by the end of June, and then go to Banjul to work on the IVS. A more appropriate use of time might be to defer the IVS work and to spend a month or so writing the draft of the Senegal irrigation report on the basis of the non-IVS information gathered. This would make a draft report available to the socio-economic team leader by early August, and would also allow the integration of the Senegal and Gambia irrigation data in a larger model if this seems useful. The IVS data could then be added as they become available. If this were done then the four major reports of the thematic case studies, i.e., those on the two dams themselves, and those on irrigation in the Senegambia would be available fairly early for inclusion in the final integrated socio-economic report.

2.2.5. Marketing in Senegambia. This report, to be done by Frank Casey, will be based primarily on two sources: results of the IVS and original research based on the adoption of Rapid Rural Appraisal techniques being used in Upper Volta. The original research part of the study has not yet begun, and as a significant part of the results will be based on the results of the IVS study, the marketing study is not anticipated to appear before the end of December. In order to be included in the final socio-economic report, the delivery date should be moved to the end of November. Although this is still late, this is one report that cannot be easily delivered earlier because Casey is extremely busy supervising the IVS in Senegal and jointly working on the BWS as well as doing this thematic case study. Moreover, although marketing is clearly important, it has less direct importance than studies such as the dam impacts and irrigation.

2.2.6. Migration in Senegambia. This study will directly address the question of the effects of the development or irrigation on the present migration patterns of the region, and will be done by Lucie Colvin, an acknowledged expert on migration in the Senegambia. As Colvin has already done much work on the subject, and since there is already much documentary evidence available, this work will be based primarily on documentary sources rather than original research. It is planned that Colvin will spend one month in Banjul beginning at the end of May. She will then return to the U.S. to write her report, with a delivery date of 30 August. No particular problems are anticipated with either the delivery or use of this report.

With the exception of the marketing case study, then, it is expected that drafts of the thematic case studies will be easily available by the end of September, with a number available before then. This should allow the reports to be easily integrated into the final socio-economic report. In fact these reports should form the heart of the integrated socio-economic team report. If the BWS will form a kind of introductory descriptive context, the thematic case studies should form the body of that report. Their mode of presentation is on the whole more direct and more accessible than the IVS (to be discussed below), because they directly treat questions of impacts. The socio-economic team leader should plan on spending a large part of September and October integrating the results of these case studies into a draft integrated report. Then as the IVS becomes available, this can supplement these studies . The thematic case studies however should be of the most direct importance for policy-makers.

The socio-economic team leader should remind researchers that care must be taken in the presentation of these case studies . The one case study that has appeared so far (Working Document No.30) is, as noted above, strong on description but weaker on impacts and proposals for mitigation. Case studies should be presented in such a way that impacts and mitigative measures are the major focus, with data presented in such a way as to support the analysis of impacts and mitigation and potential enhancement of positive effects.

2.2.7. Guinea Case Studies. There are three more thematic case studies planned for Guinea, which in gener l parallel the studies for the Senegambia. These three studies are a study of migration in Guinea (to be done by Andree Wynkoop), one of marketing in Guinea (Rolf Jensen), and one

oriented around public health (Alice Hamer). There is no irrigation study planned for Guinea as irrigation is so rare at present. Nor is there to be a study of dam impacts since the dams planned for Guinea are at a much earlier planning stage. Because the Guinea work has so recently begun and the effort as yet has been on the more general descriptive studies, plans for the thematic studies are not as yet very far along and no assessment can be made of them. It is clear, however, that they will not be available for inclusion in the first integrated draft report to be presented to AID/OMVG in December. They will instead form part of Guinea report to be submitted at a later date.

2.3. The Intensive Village Studies (IVS)

2.3.1. Overview of Senegambia Studies. The intensive village studies (IVS) are the most controversial part of the socio-economic studies. During the early phases of the project (early 1983), this controversy occupied the major actors at both the University of Michigan and OMVG. The original UM socio-economic team leader argued for the importance of emphasizing the IVS while the OMVG was against it. Despite the controversy, the IVS was implemented, and then the socio-economic team leader left the project for personal reasons. Now the major actors (the sociologist at OMVG, the present socio-economic team leader and the UM project director) are agreed that the emphasis given to the IVS in the original Workplan is too great, but that once begun, the studies should be continued as originally conceived. However, the overall attitude toward the IVS is ambivalent, and the use of the IVS is somewhat problematic. In order to understand some of the problems of the IVS, it is necessary first to understand its structure and organization.

The IVS is a very intensive study of household inputs and outputs, with an emphasis on agricultural production. The philosophy of the IVS, discussed in detail in Working Document no. 15, is based on thorough following of compound-based production units throughout the year. A very crucial input in Sahelian agriculture being labor, much emphasis is placed on labor allocation although many other inputs and outputs are also followed. To get accurate information on inputs and outputs in the IVS, reliability of data is maximized by the regular recurrent interviewing of people about their activities over short periods of time.

Because of the need to interview the sample population frequently throughout the year, or at least through the whole agricultural season, samples must be kept rather small, and the level of effort needed to do the actual interviewing is rather high. Thus one controversial aspect of the IVS is the amount of labor needed to follow the relatively small (and questionably representative) sample through the period of a year. To do their job properly, the interviewers also need to be supervised rather closely, and so a rather high degree of management and supervision is also involved.

In light of these constraints, it was decided to do a sample of ten village units in Senegal and The Gambia. The criteria for the selection of these villages is elaborated both in the UM Work Plan and Working Document no. 3. The ten villages were chosen not to be representative of the region as a whole, but rather were chosen from priorit, areas of the basin to investigate

the effects of likely dan construction and the accompanying planned irrigation projects on the region. Although this was somewhat controversial at the time, it seems to have been a sensible decision, as it will bias the utility of the study toward the concerns of the policy-makers.

The personnel of the IVS are graphically demonstrated in organigram No. 2. As can be seen the organization is very centralized, and contains a relatively high proportion of supervisory/management staff. Senegal and Gambia each have a supervisor, F. Casey in Senegal and C. Scharffenberger in Gambia, both of whom have other responsibilities. In Senegal, where there are four village units, Casey oversees two Senegalese supervisors, one of whom supervises two interviewers, the other of whom supervises four. The total sample includes 119 household units, of which 112 are also used for the collection of labor data. In Gambia, there are three supervisors, supervising a total of nine interviewers in six village units. The total size of the Gambian sample is not known but in two of the villages, there are 61 families in the sample, in 20 of which labor allocation data are collected. The local supervisors visit the interviewers regularly to see that they are filling out the forms correctly. In turn the two zone supervisors visit both the local supervisors and the villages regularly for another level of control. Overall, the control seems to be quite rigorous and of very high quality. In studies of this kind, there are always problems related to both the truthfulness and forgetfulness of the villagers. However, they seem to be minimized insofar as possible in these studies; rapport in virtually all the villages is very good, and the dedication and rigor of the majority of the staff is clear. It seems that for this kind of study, the quality of the data produced will be very high.

Note however that the high quality of the data comes at a cost — a very high level of supervision. The original Michigan contract foresaw 36 researchers for survey work, supervised by six local supervisors, supervised in turn by the two senior staff, a ratio of six interviewers to one supervisor. In the Workplan however, this ratio had been reduced to three interviewers to each supervisor, for a total of 18 interviewers and six supervisors. Several extra expatriate supervisors were added to the senior staff. In fact, there are five supervisors and 15 interviewers, plus one American supervisor for each of the two countries. This is a very high rate of supervision and management, and adds to the expense of this kind of study.

The IVS collects a number of different kinds of data at different frequencies. These data can be grouped by the frequency at which they are collected. The labor allocation data, collected biweekly, are the most frequently collected. Here information is gathered on the major activities of different members of the household over the preceeding three or four days. This process of data collection is so time consuming that the sample used to collect these data is a sub-sample of the overall village sample, the numbers referred to above as the labor data sample. The second major set of questionnaires are referred to as the "bi-monthlies." These are a series of questionnaires about the major inputs and outputs of the household during the preceding two weeks (e.g. staple foods, livestock, salaried labor, non-farm income, non-salaried labor, plus forms of strange farmers, hunting, fishing, and fuelwood use). These bi-monthlies in fact form the major part of the IVS studies. They are administered to the entire sample noted above.

The regularly administered questionnaires are supplemented by others administered either once or on an irregular basis. Although it was planned to do a rather large number of these questionnaires, only a few have been drafted and used. Those done have on the whole been concerned directly with agriculture and included a special set which measured fields and calculated production quantities at the end of the agricultural season. The original list, published in the Workplan, has been changed somewhat, and while the subjects of interest remain the same, the actual titles of many of the remaining questionnaires will change.

The goal of the IVS study was to cover an entire year from June 1983 through June 1984. However some changes have been made in light of agricultural practices. In those villages where irrigated rice agriculture is not practiced during the dry season, (i.e., where all agricultural activity has already finished), the labor allocation questionnaires have been stopped so that the interviewers have time to do some of the supplementary work discussed below. On the other hand, in villages where there is a significant amount of rice cultivation, but where the harvest does not take place until after June, it is expected that the labor allocation questionnaires will continue until the rice harvest terminates in July in most villages. The bi-monthlies will however continue through June 1984 in all the villages.

2.3.2. Accomplishments and Problems. Overall, the IVS research strategy is one which stresses depth of knowledge over breadth of knowledge. Very much detail is gathered about restricted aspects of the lives of a small sample. The sample must remain small because of the immense cost (in time and human resources, hence money) of this kind of research. But the quality is higher and the detail much greater than if information were gathered through single interview questionnaires. There are certain kinds of studies where it is clear that depth and rigor of a study like the IVS is preferable to one with more breadth. The question that remains is whether that is the case here.

As already noted, the major University of Michigan socio-economic personnel think the IVS was originally overemphasized. On this, the Evaluation Team is in agreement. As a conceptual level, this is because the IVS emphasizes agricultural systems over other kinds of production systems, and focuses too exclusively on that single aspect of the rural milieu. As already noted, this is also a problem with the BWS and will be discussed in Section 4. below. In addition to this conceptual problem, there exist specific problems of data analysis for the IVS, which come from the heavily quantitative aspect of the data generated, and the lack of anyone on the team to have both the time and the skills to analyze them.

First of all, the quantity of data generated by the IVS is huge. The labor allocation studies will generate the greatest amount of data, approximately 200,000 lines. The bimonthlies will generate fewer data but will be in a large number of different files since there is one for each questionnaire. The original designers of the IVS did not really anticipate the huge amount of data that would be generated, and did not plan out the form and manner of data aggregation and analysis. THe scale of this task was only seriously understood after the visit of a UM consultant, in June 1983, to

document the size of the data processing requirement and to make some recommendations about how to handle it (Working Document No. 6). As a result of this work, it became clear that the requirements were gigantic and that the socio-economic team needed some help

After a number of different alternatives (e.g. mainframe in Dakar, mainframe in Ann Arbor) were considered, it was decided to do data processing in Banjul using IBM micro-computers. Five micro-computers have been purchased (four PC's and one XT). The XT, which has a larger capacity, is currently used for data analysis and word processing, while the other machines are used primarily for data entry.

Hardware is of course not sufficient, in and of itself, for analysis and the project also had to address itself to the question of capacity to use the hardware. There was no one on the project who had the time and ability actually to do these tasks, so another consultant, Leonard Malczynski, was hired to organize the data processing. Although he got a late start (arriving September 1983, three months after the beginning of the IVS), he has written programs, trained a data entry staff, and has substantially caught up on the backlog of data entry.

Although steps have been taken to get hardware and personnel to do the data processing, it is still a long and complicated process to do the analysis. There are many different steps, all of which must be followed in a precise order before any write-up of the IVS is possible:

(a) control and correction of forms in the field
(b) physically transporting the forms to Banjul
(c) keying the forms
(d) aggregation of the files in a form useful for the analysis planned
(e) choosing the computer programs to do the necessary analyses
(f) running the programs
(g) interpretation of the outputs generated
(h) writing the report using the analysis

Each of these tasks has its own set of potential bottlenecks and problems, so each must be examined in turn.

(a,b) Once the data are collected, they must be controlled by the two different levels of supervisor and actually sent to Banjul to be keyed into the system. This means that there is a lag between the time that data are actually collected and when they can be physically put into the operating system. In theory, data can be brought to Banjul on a monthly basis . If approximately two weeks are necessary for control, they should arrive to Banjul two to three weeks after actually being collected(e.g. data for the month of April should arrive in Banjul by May 20). However, for almost the first half of the study, the data processing system was not operational because several months were needed to make it work once Malczynski arrived. Thus there was a great backlog of unprocessed data.

Once the data are in Banjul, they are keyed into the system. The project has trained five keypunchers, three Gambians, who work in English and two Senegalese who work in French. They work in double shifts, English language keypunching done from 900 to 1500, French from 1500 to 2100. This staff is sufficient , given the number of machines available. Nonetheless it takes time to key data. Even if the data are transported to Banjul in a timely fashion, they will not be on the system until approximately six weeks later.

(c) Once the data are on the system, moreover, they are not yet ready to be analyzed. To understand what needs to be done, it is also necessary to understand what does not need to be done. A number of steps have been introduced which cut down mechanical processing. First there is a program for direct editing as keying is done, i.e., the computer automatically checks to see if the values being keyed in are valid for the relevant variable. There is no need for an extra set of programs to collect the data. The data are essentially ready for analysis as soon as they are on the system. There is also a second program which allows the machine to write automatically parts of the data which are the same as the preceding line, thus saving the keypuncher's time. This also means that the total number of keystrokes necessary has been decreased from the original large estimate. Although the operation remains of large scale, it is somewhat smaller than that originally foreseen.

(d) The next step is aggregation of the data sets in a form useful for analysis. Because the data sets, in particular the one on labor allocation, are so large, it is impossible to run analyses directly on the data sets themselves. Rather data must first be aggregated into smaller sets so that the packages available for the IBM can be used to analyze the data. This means two things: analyses must be clearly thought out before hand; and secondly, a time consuming extra step (data aggregation) must be performed before the actual analysis can be done.

(e) The next major problem for the IVS is that of the actual planning of the data analysis. There is no one on the IVS team who has both the expertise and time to do the kind of analysis possible with this data base. While the data processor is an agricultural economist and knowledgeable about statistical analysis, he retains so much responsibility for actual data processing, programming, and management of the data processing unit that it is unlikely that he will have much time to put into conceptualization of the analysis. The other economist on the team, Casey, is also too busy with other responsibilities to have the time for planning IVS analysis.

The first level of the analysis planning then is finding someone to do it. The most likely person to do the job would be an experienced economist; this would add complementarity on two levels: both economic and quantitative analysis. Michigan has already prepared to hire an economist by July, and it is imperative that this be done. The person recruited should have a good understanding of what kinds of statistical analyses are feasible on micro-computers, as well as a good intellectual understanding of the

substantive issues involved in irrigation farming. While an important task of the economist would be the analysis of the IVS, this would not be his/her only task. The economist would also be involved in economic analysis of case study material and preparation of the final socio economic reports (see 3.0. below)

The problem is deeper however than simply finding someone with expertise in quantitative, economic analysis. More qualitative information is also needed in order to facilitate analysis. The quantitative data from the IVS can be used to understand actual numerical relationships between different aspects of the farm/household production system, but the data cannot themselves be used to generate information on how those relationships came to be, why they exist or how they are interpreted by the people who live in those households all of which is important for understanding potential changes in the region. For this, more qualitative information is needed to help researchers generate hypotheses which can then be tested using the IVS data. It is clear that individual researchers have in fact generated some of these hypothese from the actual process of living and working in the field for the past several months, but it is also true that these are not being generated by any systematic framework of analysis. Although this problem is especially marked in the IVS, it is linked to the overall quantitative bias of the study as a whole. Recommendations as to how to deal with that are in section 4.0. below.

(f) Once the analyses are planned, the programs can then be run. Even though UM has packaged programs, these often need some adaptation and transformation of the data. It is much faster to use packaged programs than to have to write them, but it still takes time.

(g,h) Good planning for the analysis will facilitate interpretation and writing, but again this takes time.

It should be clear that the process of analyzing the IVS is itself complex and time-consuming. It will be impossible to do a complete analysis of the IVS for the draft socio-economic report in the time allotted. The solution is not more time, but selectivity in the analysis. Given the focus and accessibility of the thematic case studies, the parts of the IVS analysis that should be given priority are those that will be directly integrated into the thematic case studies, and secondly those that can support the BWS. Direct analysis of the IVS itself should be of lower priority. The socio-economic team leader and the economist should decide the most important issues that will not be addressed by either the BWS or the thematic case studies. These should be the primary focus of direct IVS analysis. Only then if time remains should other IVS analyses be considered. Further discussion about the form of the final report can be found in 4.0. below.

2.3.3. Guinea

There is no IVS per se planned for Guinea. However there is a Guinea phase for the collection of baseline data. It will be discussed here because it is functionally equivalent to the IVS. The methodology and staffing are quite different however. There are a number of reasons not to do an IVS in Guinea. The study period is shorter; the development priorities are

different; and the team in charge of the studies is less committed to an IVS approach. Moreover, there simply is very little descriptive information available on this area of Guinea. It was thus decided to adopt a research strategy which concentrated on basic descriptive studies of production systems rather than building involved quantitative models.

The Guinea study has five basic questionnaires. First is a village census, called an "etude de base" because of negative connotations of the word census in the region; this collects basic information on village demography. Second is a simple agricultural calendar which details the basic agricultural activities of the village. Third is a simple non-agricultural calendar which determines major off-farm activities during different seasons of the year. Fourth is a marketing survey. And fifth is a geographic description of the village, noting such things as major water resources, fields and a description of the soils. It is also planned to gather village histories which document changes over time. As this information is gathered and rapport is established, this basic set of questionnaires will be followed by others. As yet undetermined however is the number and scope of these additional questionnaires. Copies of the forms were unavailable in either Banjul or Dakar, so no assessment can be made of their comprehensiveness. The overall strategy is to combine qualitative and quantitative information, in the way foreseen, but not done, in Senegambia.

The studies in Guinea will be done in several distinct areas,(Koundara, Koubia, and Mali), and the study team will be structured as outlined on organigram No. 2. In general 12 villages will be covered by the team, with one interviewer stationed in each of the villages. Overall supervision will be done by the Guinea team leader, R. Jensen, with the aid of A. Wynkoop. Supervision of the interviewers will be divided on a geographic basis among Jensen, Wynkoop and a Guinean professor, Fode Keita. Supplementary special studies will be done on the subject of public health (by Alice Hamer) and minority groups in the Fouta (by Guinean professor, Oulare).

The interviewers were chosen, trained and placed in the villages in early 1984, and the initial phase of research was finished in late March. Wynkoop and Jensen left Guinea for consultations a short time after this; in their absence, Sekou Toure died and a coup put a military government into power in Guinea which temporarily closed the borders. The studies will continue, but some delays are to be expected as contacts need to be made with new government officials. At this time, any long term effects of the coup and new government on the study are unclear. At present, Guinea research is planned to terminate as the end of October with reports due the end of December.

Two points need to be clarified. First is the use to be made of the computer in the Guinea analysis. If the computer is to be used (likely, if there is quantitative data), then copies of questionnaires should be sent to Banjul as soon as they are finalized so that plans can be made for data entry. Plans should also be made for the regular transport of completed forms to Banjul so that data entry can be done in a timely fashion. Analyses should be planned well before the actual end of the study to facilitate write-up and integration of the data in the final report.

Secondly, the problem of timing and integration should be clarified. There seems to be some expectation of partial integration of the Guinea material in the first draft report to be presented to the OMVG in December. As things stand now, this is impossible. The Guinea socio-economic report should appear on a separate report, integrating all parts of the study by December 31, if the study ends on October 31, 1984.

The Evaluation Team however recommends that this date be extended by two months, i.e. that the Guinea studies continue through December 1984 with a Guinea report due on February 28, 1985. The major advantage to this is that it would allow the studies to continue through the major harvest season and allow some sampling of production, even though this will not be as rigorous or detailed as in the Senegambia IVS.

No matter what the final delivery date is, however, the team cannot wait to do analysis until the study is over, but should begin working on preliminary analysis by the halfway point. Otherwise they will not be able to fulfill their contractual obligations on delivery date.

3.0 Coordination

Such a complex set of studies requires a rather large degree of management to ensure that studies are carried out as foreseen and that timeliness is respected. There are two major aspects to the management of the Socio-economic studies: the team leader role and the support service.

3.1 The Team Leader

The original University of Michigan contract specifies a socio-economic team with two senior staff: a rural sociologist/social anthropologist and an agricultural economist. Although one of these two was to be team leader, the relationship between the two was conceived of as rather egalitarian. They were to be the only two professional full time expatriate staff over a team of member-state enumerators and American and member-state graduate students; the qualifications and experience requested of both were essentially similar. Their skills would be complementary: social and economic aspects of production on the one hand, qualitative and quantitative research techniques on the other. And they would work together on conceptualization, implementation and analysis of the studies. Details were to be spelled out out in the University of Michigan Workplan.

Due to the particular history of recruitment and staffing of the socio-economic study, this conceptualization has not been realized. When the University of Michigan contract was signed in October 1982, the sociologist team leader (Dr. John Sutter) had already been identified, but Michigan was unable to locate an economist to replace the one in the initial proposal who was no longer available. Sutter joined the project formally in January 1983, but as a condition of employment requested the participation as a consultant, of a geographer, Dr. Michael Watts who had previous experience with this kind of research in Northern Nigeria. Basic conceptualization was done by this team composed of a sociologist and a geographer, with input from CRED, but no full time staff economist.

UM was ultimately unable to recruit a PH.D. level economist for the job, so finally hired Frank Casey, at a Master's degree level, in May 1983. Because he was not on the team until this late date, he did not participate in overall research design nor in the design of the IVS, the largest part of the effort. In one of his roles, design and implementation of the BWS, he played the major collaborative role foreseen for the economist. This he did jointly with a short-term anthropological consultant however, not with the socio-economic team leader. In his other roles (the marketing case study and supervising the Senegal IVS) he occupied a role structurally equivalent to the American "graduate student" researchers, and not that of a senior staff member. This is shown graphically on the set of organigrams of the socio-economic studies. Moreover, he had the most disparate roles of any of the staff (three), and resides in Tambacounda while the socio-economic management center is in Banjul. Through no fault of his own, it is clear that in the past he has not functioned jointly with the team leader in planning. Nor is it likely that he will be able to participate in planning overall data analysis for the final integrated socio-economic report or in writing it. Nonetheless, he did serve as acting team leader from July 1983, when Sutter resigned for personal reasons, until September 1983 when Dr. William Derman was hired as the new Team Leader.

Derman's position however is also ambiguous. One of the few Americans to have ever done field research in Guinea (in the 1960's), he is uniquely qualified to do the Guinea portion of the research. Before assuming the position of Team Leader, he had been involved in the UM planning for Guinea, and had made the reconnaissance trip there. The original plan had been for him to serve in Guinea as Team Leader for the Guinea portion of the study. This was a senior position in addition to the two already existing senior staff positions for Senegambia. However, when Sutter resigned, UM had to recruit a replacement. In order to get a new team leader into the field quickly, it was proposed that Derman take over as overall team leader, and this was accepted. Although another person was recruited as Guinea Team Leader (Jensen), Derman has had greater direct input into the Guinea portion of the study than another Team Leader might have had, and approximately six months in his contract are assigned to the Guinea work.

The lack of a Team Leader for an extended period meant that most of then thematic case studies were conceived by the individual researchers. While they all have done a good job on an individual basis, there has been little coordination among them. Nor has there been coordination with the BWS or the IVS, both designed by others.

The present Team Leader thus finds himself in a position where he has designed no major part of the Senegambia research, but now must coordinate much of the analysis and the final integrated write-up.

This has led to a perception on the part of the Socio-economic Team, and the overall Michigan project direction, that there is disorganization and lack of coordination of the Socio-economic Team. It is one of the positive findings of this evaluation that things are not as disorganized as they seem, and that some simple steps can be instituted to increase the coordination of

the Team. Since the Socio-economic Team should prepare a final report by approximately the end of September, to meet their final deadline the focus of coordination and integration must be around the production of a draft socio-economic report.

Several steps are in order:

First, the Socio-economic team leader ought to prepare a draft outline of the final report ASAP. This ought to include a draft outline of chapters, including substantive issues to be covered in each of the chapters, the data to be used in these chapters (i.e., from which section of the overall research the material will come), and a schedule for the completion of each chapter. This will prove valuable for a number of purposes. It will orient the production of the individual reports for the thematic case studies, the BWS and IVS. Some of the researchers are unclear about how to focus these. If they can see how each piece will fit into some kind of whole, they should be more easily able to focus the production of their own individual reports.

This can also be a useful tool for scheduling the use of support staff as well as for the timing of the researchers who fulfill several different roles (i.e., who have to prepare portions of more than one of the parts of the studies). In particular, it can be used to schedule the input of the economist and of the data processing staff who can then be used more efficiently. This will also be useful for interaction with project management and with the other teams. Some of the other teams claim not to know what the socio-economic team is doing; a draft outline of the final report would enable the other teams to see the issues that the socio-economic team will treat and the general way in which they will treat them. Concomitant to the preparation of individual team reports by team leaders, overall project management is working on a plan for the overall integrated report. Availability of the socio-economic team draft outline would be invaluable to project management in order to better prepare their own report.

Second, a month-by-month time schedule from now until the end of the project should be prepared. This should include all the major tasks to be completed each month for each one of the studies as well as the final integrated report. An example (figure 4) is attached.

Third, due to the problems discussed above, it will be impossible to have a final draft socio-economic team report by September 30. There is no reason however why the final socio-economic report needs to be done before the total integrated report. As long as the major trends are clear by September 30, the socio-economic team should be able to aim for a deadline of December 1, 1984 for their total report on the Senegambia (assuming translation completed by 30 December).

There are several ways to facilitate this . (a) Those pieces of research that will not be complete by September should be broken up into two parts. The IVS, for example, can be disaggregated into rainy season 1983/84 and dry season 1984 portions. As the rainy season (and its associated harvest) has been over since January 1984, work on that part of the IVS

analysis can begin immediately (or as soon as all data are keyed) and be finished by September. The section on dry season 1984, which cannot be done by September 30, can then follow; it should go faster too since the basic strategy of analysis will already be determined. This approach of breaking a study into two parts may also work for other studies, such as the Senegal irrigation study, which will use some dry season IVS data. Large parts of the socio-economic report can be written by the end of September and these submitted for use in the final integrated report.

Fourth, a Ph.D. economist who can oversee economic analysis for the final integrated report must be recruited, and in place by July 1 at the latest when much of the material will be available, and analysis of rainy season IVS can begin. The economist should work jointly with the team leader in the overall planning analysis and writing of the final socio-economic report.

Fifth, the team leader should spend the majority of his time on the overall management and the analysis and presentation of the final report. Although his role in getting the Guinea work off the ground was important, his top priority ought now to be focused around the final report.

Sixth, the support staff ought to be strengthened. This will be discussed in the next section.

3.2. Support Staff

Successful completion of the socio-economic team report depends not only on the research staff but also on the support staff. Support comes from within the socio-economic team as well as from staff of the larger project direction. Within the socio-economic team, there are two major support issues: data processing and translation.

The data processing unit has already been discussed within the context of the IVS. Although the IVS is the major task facing the data processing unit, it is not the only one. At the end of June, when demand for data processing for the IVS will be high, the thematic studies will also be coming to an end, and data will have to put into the system for some of them. The staff for data entry is adequate, but this still leaves the steps of programming and analysis. Programming is a particular problem. At present Malczynski is the only one who can develop applications even with the packaged programs. He was supposed to be provided with a programming trainee as part of the trainee program, but the individual provided has proved incapable of learning to program.

The process of getting the report done on time would be greatly aided if someone could be found to work as a programmer with Malczynski. The need would be greatest during the period of June/July through September, 1984; although the services would be useful through November. The original request was for a Gambian, since the person needs to have English capability as much of the available software is in English. Since it has been difficult to find a Gambian with the necessary qualifications, it would be better to look for

someone from any of the member states who knows English. One possibility is to recruit a University professor over summer vacation who would like to earn some extra money. It is, however, crucially important that the person recruited have some prior programming experience, and of preference, experience on micro-computers.

For analysis, the major support would come from the economist, who has been discussed above.

Translation must also begin before the final preparation of reports. Moreover, given the size and complexity of the socio-economic reports, it would be worthwhile to hire a translator, particularly for the socio-economic team, sometime during the summer, around August. All write-ups, in both languages should be put on the IBM. As soon as a part is fairly fixed, it can then be translated and stored on the word processing unit. Using the word processor, neither typing nor translation need be done in a particular order, but can be done in small pieces as available. Doing as much as possible ahead of time will diminish clerical tasks at the end of the project.

There is also support for the Socio-economic Team for other sources. On the whole, the Socio-economic Team has found the support offered by AID and by UM home office at CRED to be timely and useful. The relationship with the University of Michigan project direction in Banjul has been more problematic. The Socio-economic Team has always held a somewhat autonomous position in regard to the overall project. Early in the project, the original Socio-economic Team Leader was based in Tambacounda, rather than in Banjul with the rest of the Team. Now the Team, under the new Team Leader is based in Banjul, but because of lack of space in the original office, they occupy their own building, with computers and staff. They are the only team with a substantial portion of their staff permanently in the field, and so have support problems not encountered by the other teams whose field work is carried out from a Banjul base.

There is some lack of understanding about the exigencies of a field operation. One example of the problem is the fact that the Banjul office has no mimeograph machine. Copying must be done either on a small duplicating machine, or else must be contracted to a printing company in Banjul. It is clearly impractical to duplicate questionnaires for use on the copying machine, so all questionnaires have been printed by the printing company. This worked well for the original questionnaires (particularly the labor allocation forms) when great quantities were required; the job was quite well done. However this has proved rather inflexible for some of the questionnaires introduced later, which are needed with a short turnaround time, and in relatively small numbers of copies. As is not uncommon in West Africa, the printing company at various times had difficulty in getting ink and/or paper, so that there were delays in getting questionnaire forms printed and distributed.

The Socio-economic Team dealt with this as well as possible. In Tamba, for example, they have found a mimeograph machine they can use. A mimeograph machine has also been provided for the Guinea team based in Labe. Some questionnaires, which are needed in very small quantities have been produced

on the computers. However this is one problem indicative of a certain lack of experience on the part of project direction about some of the practical constraints of working in Africa. Although none of this was critical enough to impede the project seriously, it did cause unnecessary delays.

4.0. Value of the Studies to OMVG

The studies will be of value to the OMVG if they are of high quality, if the different studies are integrated one with another, and if the information is presented to OMVG in a manner useful for their concerns. This section will look at the questions of quality and utility. The question of integration will be discussed in section II.F., below.

4.1. Quality

The quality of the individual studies discussed above is high. Data are being carefully collected and studies have been well conceptualized. At this point it is impossible to foresee the quality of the analysis, but there is nothing to suggest any serious problems. The problems are not so much in the quality of the studies already being done, but rather in terms of the larger conceptual effort. In particular, the studies exclude certain subjects of importance. There are three that are particularly problematic: (a) the definition of production systems as farming systems, ignoring natural resource use; (b) the bias toward quantitative data and the resulting lack of qualitative, contextual data; and (c) a lack of technical agronomic information.

4.1.1. Bias Toward Farming Systems

Because the focus of development through the OMVG will be irrigated agriculture, the socio-economic studies were focused around farming in the region. Although this focus is sensible, the studies have already been too focused on farming, and not enough on other aspects of the production system. It is important to remember that rural production units, even those based on farming, involve more than farming. In particular, farming is closely integrated with direct natural resource use, livestock production and household maintenance activities, none of which are well covered in the study.

A number of resources are taken directly from the environment. Important among these are fish and firewood which are also being investigated by some of the other teams. A number of goods and other household goods are often made from products gathered from naturally occuring sources. In this region, these include products such as honey, tamarind, bamboo, bush yams and baobab products. Some of these are used directly by the household; others are sold. Some are used as is; others are processed. These products form an important part of household consumption and many may be affected by dam construction and the extension of irrigation.

Livestock has also been neglected. Although there are bi-monthly questionnaires on livestock entering and leaving the unit, there is little information on the social organization of livestock production, how decisions are made about keeping or selling livestock or the ways in which livestock are integrated in farming enterprises. This is especially important where there is high use of animal traction.

Finally those activities which serve to maintain the household have been ignored. Yet the ability to have time enough to prepare food for the family may suffer if food preparers need to spend more time in production due to changes brought by irrigated agriculture or more time searching for fuel is required because of environmental impacts of dam construction. Household maintenance activities and the time spent on them may also play a role in agricultural decision-making. For example, choices on which grains to grow may be based not only on soil and rainfall but also on the facility of processing with a traditional mortar.

There is clearly no longer time to do major studies on these topics. Even if they were, that would be inappropriate. Enough needs to be done however to understand how these other activities relate to the major interest in agriculture. Some suggestions on how to deal with this lack will be offered after looking at the second bias, toward quantitative rather than qualitative data.

4.1.2. Qualitative information

The studies were originally conceptualized as integrating both quantitative and qualitative information, but the decision to do the IVS which gathers large amounts of rather restricted quantitative data has meant that the balance of the studies as a whole has been toward quantitative data. The result has been that there is not always enough qualitative, contextual data to interpret all of the quantitative data being gathered.

In particular, information on the following issues, crucial in understanding the impact of dam construction and irrigation, is lacking:

(a) Changing patterns of land use and land tenure, particularly in light of the implementation of irrigation projects. Certain villages lack land, others have surpluses; this varies not only with placement along the river but also with other characteristics, such as ethnicity. The success of irrigated agriculture could easily result in the disruption of the heavily traditional land tenure system which still exists, causing serious land distribution problems.

(b) Authority patterns in the region, in particular interaction among local, national and regional authorities, which will become crucial if large scale irrigation plans are implemented. Also useful would be a study of indigenous groups which may have management capabilities and could be transformed to implement programs associated with dam construction and irrigation

(c) Patterns of natural resource. Already discussed above, it should be noted that information on natural resource should not only include a factual study of how those resources are used, but also information on patterns of ownership and control of those resources, and how these may have changed during the recent past. Very closely related to this is the question of livestock ownership and control. Also related to these questions of ownership and control are the questions of interethnic relations. Interethnic relationships become particularly salient when there are competing claims over different resources. This was clearly illustrated in West's discussion about the Kekreti impacts, but more work needs to be done on this in the region as a whole.

(d) Further information on where it is that people invest the money they have available. While it is true that there is information on investments in agriculture and livestock, there is no information on other large scale purchases, e.g., on large scale consumer goods (houses, roofs, mosques, etc.) or on major social purchases such as payment of bridewealth or adiya. It is clear from other work on Africa that people have to allocate major investments between productive ends and ends which are not directly productive. If an irrigation project presupposes major new productive investments, it would be useful to know to what extent people are willing to makes these kinds of investments in contrast to alternative non-productive investments.

(e) The integration of women and their non-farming roles into the production system. Women have complex roles in rural production systems: in addition to farming, they are major food processors and food preparers. Both they and men gather different kinds of natural resources, e.g. fuelwood, fish and other wild products. As noted above, the emphasis on farming has meant these other activities are underinvestiged; moreover the way that this complex set of activities fits together to form a diverse production system is underestimated. Since women's activities are often more diverse than men's, slighting their activities means underestimating the diversity of the production system. The converse is also true: concentrating on farming as opposed to a more diverse conceptualization of production underestimates the contributions of women to the production unit. Since "development" of agriculture often means a lower diversity of the production system as the family concentrates production on a few renumerative crops, potential charges in women's roles should be investigated in any study of dam and irrigation impacts.

The UM socio-economic team is aware of these two sets of problems: the strong bias to farming and the lack of qualitative data. Some of the suggested topics have begun to be investigated or are at least planned; potential questionnaires are on the list given in the Workplan (Working Document No. 4: 25). However, this work is of lower priority than that already underway, and risks not being done because of existing commitments by the personnel on the team. While it is not possible (nor even desirable at this point) to do any major studies on these topics, these questions should be given greater priority than they are now given. One way to do so is to do a series of very short focused studies which could be integrated into the final report.

If studies are to be added, the major question is how to find the personnel for them, and the timing and organization of the work. The solution will likely be different for each of the three countries. In Guinea, where the IVS will not be directly used, there is already a commitment to investigate these kinds of topics in addition to agriculture, and to do so in a way which integrates qualitative and quantitative data. There should be no problem with personnel or timing since little work has begun and these things are already planned. In Senegal, the supervisory team has begun to try to include some qualitative work, although not necessarily on precisely these topics. And this should provide a model for the way to investigate these problems. In Gambia, the workplan of the supervisor is already so heavy from now until the end of the project that it is there where there will be the most difficulty in getting the data.

In Senegal, the interviewers have been asked to keep journals which cover a variety of topics, and they have also been asked to investigate in detail certain topics. These will then be written up and integrated into the report in some form. This work has just begun and its actual form and content are still unclear. The basic format to be followed is one which makes use of the knowledge of the people already in the field and who have been in the field for the year. Both interviewers and supervisors have a great deal of knowledge about local conditions and can be tapped without having to launch a full scale new study. They can be kept on past June 30 to do this during July and August. However this information can be tapped only by someone who has the knowledge of how to gather and interpret this more qualitative information.

It has been suggested that the Team Leader himself perform this task, as he is an experienced anthropologist. While this is theoretically a good idea, it is fairly clear that he does not have the time: he needs to focus his work on management and production of the Socio-economic and Final Reports.

What is needed are one or two people who know the region well, and are trained in methods of more qualitatively oriented analysis. The optimal solution would be to call upon the training funds available in the original project (which have not been used) to recruit an experienced member-state sociologist/anthropologist. This could be someone seconded for several months from a ministry or other national organization, or found among academics on summer vacation. What is crucial is to find someone with appropriate training and experience who can get the job done in the appropriate timeframe. The appropriate timeframe would be to have research begin any time, to be concentrated in July and August when the enumerators and supervisors' other tasks are finished, and then to be written up during September, ready for inclusion in the final report by the end of the month.

If someone with these qualifications is not available from the member states, it would be possible to recruit someone from the U.S. with appropriate qualifications. The person could either be an experienced professional, or a younger professional with previous field experience in the area. Either of these alternatives would of course be more expensive, and would not work toward building member state institutional capacity, but they may be more efficient.

4.1.3 Agronomy

Finally, it would have been useful to have had some technical input into the studies by an agronomist. This is true for the two agricultural surveys (the BWS and the IVS) as well as the case studies on irrigated agriculture and dam impacts. Agronomic input would have been useful not only for analysis but also for determination of the technical feasibility of mitigative measures proposed for agriculture. Some short term consultation by a soil scientist is scheduled this summer for the irrigation studies, but this is very little and very late. This lack of agronomic input is also present in the OMVG planning unit which monitors the UM studies. In the OMVG, agricultural research is done by a parallel unit separate from planning.

It is probably too late to integrate agronomic information systematically into the UM studies. This was never written into their contract in any case. Instead, it is a field in which the OMVG Planning Division ought to consider undertaking more work, done in conjunction with the Agricultural Research Division.

4.2. Utility

High quality studies are of no value unless they are useful. There are two aspects to this question of utility. The first has to do with presentation: are the data and reports presented in such a way as to maximize utility to the OMVG? The second aspect has to do with institutionalization of the capacity to make different use of the data sets and technology that will be left by Michigan to the OMVG.

4.2.1. Presentation

Data must be presented in a way they will be most useful to the OMVG for planning purposes. While descriptive results are necessary, what is more important is the analysis of what those results mean in light of different scenarios for the development of the basin. It is crucial that the focus be on the potential impacts of a particular development scenario, and in turn that impacts be linked directly to plans for mitigation of negative impacts and enhancement of positive ones. The two socio-economic drafts already available (Working Documents No.22 and 30) show high quality descriptive work, but they need to be reworked to link that description to predictions of impacts and recommendations in light of the prediction. Suggestions for specific future research needs should also be made where necessary.

Results should be made available to the OMVG on three different levels. First, there should be a summary which discusses potential of impacts and mitigative recommendations for each particular development scenario proposed. Second, this should be accompanied by a report which presents the evidence used to arrive at these impacts and recommendations with description focused on links between data and the resulting recommendations. Third, the OMVG will have the raw data, so that if it so desires it can reanalyze the data to verify the conclusions of the study and/or to reinterpret them in light of new developments. This is already planned, but it is worth emphasizing the value of doing it this way.

4.2.2. Institutionalization.

The second aspect of utility is institutionalization - - whether the OMVG will have the capacity to access the data for its own purposes and whether it can use them as baseline data for a monitoring system. This has two aspects, the training of personnel and the institutionalization of a basis for monitoring within the Planning Division of OMVG.

Training has several different levels. First, there is the training of the Member State sociologist and economist of the OMVG Planning Division. The purpose has been to acquaint them with the UM studies, and to give them some actual field experience. They both have gone out to the field with various team members, and the sociologist spent several weeks in Banjul learning to use the computers. Although this is not formal training, they are gaining familiarity with the data base that will be useful in the future.

Second, there is the formal training program. Four slots were given to the socio-economic team, one for data processing and three (one each from Guinea, Gambia and Senegal) for socio-economic research. As noted above, in Section 2.3.2., the data processing slot was not effectively filled. In addition, only one of the three research slots was filled, the Senegalese one. This individual , from the Ministry of Rural Development, has been stationed at Tambacounda, and has done, or will do, a wide variety of tasks (field research, documentary research, analysis and writing) before he leaves. His work was so useful that his initial contract was extended. This one trainee will achieve the desired goal, to have individuals in concerned ministries of member states knowledgeable about the OMVG program. It is regretable that the other member-states did not provide people, as UM made efforts to recruit them.

Third, there is the level of coordination with member state institutions who do similar kinds of research. In its proposal, Michigan suggested the use of pairs of U.S and member state graduate students for major parts of the research. In the contract, the hiring of six local researchers for the case studies is foreseen; they "may be American graduate students if they speak a local language of the Gambia River Basin" (UM Contract: 18). As things were finally implemented, coordination with local research institutes has been negligible and all case study researchers are Americans. Although the quality of this work is good, there should have been more direct participation of local researchers and research organizations, especially in Senegal where there are a number of qualified individuals. It is now too late to do anything about this, except as already proposed in the section on qualitative research above.

Fourth, there is the level of supervisors and enumerators. At least twenty-one individuals at these levels have been employed by the project. They have had a chance to learn and use skills as well as to have remunerative employment. Use of them to collect the more qualitative data as suggested above will increase their range of skills and future employability.

The ability of the OMVG to use the Michigan studies as the basis of a monitoring unit is the other part of institutionalization. Obviously the OMVG will not be able to update all the UM Socio-economic data from year to year, as the UM studies were done on a vast scale which OMVG will not have the resources to duplicate. However, a monitoring system can be designed which uses certain of these data as baseline data, in order to chart socio-economic changes occurring within the basin, both prior to and following project implementation.

OMVG sociologists and economists will have the main responsibility for the design and execution of monitoring, but in order to use the UM data as a baseline they must know the data base well and know also how to access it through the computer system. Although they have been working somewhat with the data processing staff in Banjul, this will probably be insufficient. The best alternative would be for AID to fund someone, preferably the present data management specialist, to work with OMVG for a period after the UM contract is over and to develop a guide to the data and set up a way to use it for further monitoring.

There remains one significant problem in using the data as a baseline. The season it comes from, 1983/84, was one the worst in the 20th century in terms of rainfall, leading to extremely severe conditions for rainfed agriculture and greater than normal interest in irrigation. There is of course nothing that can be done about this, but care must be taken in interpreting these baseline data.

5.0. Conclusions and Recommendations

Although the socio-economic studies are coming along well, some minor modifications need to be made:

5.1. Timing

It will be impossible for the socio-economic team to produce an integrated socio-economic report of high quality in the time available. Thus it is recommended that the delivery date for the integrated draft report on the Senegambia be delayed until December 31, 1984, and the socio-economic report on Guinea until February 28, 1984. The delay in the Guinean delivery date is tied to a recommendation to continue field research until the end of December so as to include a study of 1984 harvests.

In order to make these deadlines however, the socio-economic team needs to do several things:

(a) Prepare a draft outline of the final reports.

(b) Prepare a schedule for delivery of individual reports and partial reports. A suggested one is attached. This will require rescheduling the delivery date of some reports and will require breaking others (e.g., IVS, BWS) into several discrete documents, each with its own delivery data.

(c) Clarify how the computer will be used for which studies and prepare a schedule according to research priorities.

(d) The team leader must concentrate his efforts on management and report preparation and minimize field activities.

(e) An economist must be hired to work on the economic analyses for the final integrated socio-economic team report. She or he should be based in Banjul with major duties concerning integration for the final report.

5.2. Supplementary Natural Resource, Livestock and Qualitative Information:

Several short focused studies on these subjects should be done with a delivery date of September 30. One or two extra personnel should be hired as discussed in Section 4.1. above.

5.3. Additional Support Personnel:

The following support personnel should be hired by June 30:

(a) programmimg assistant for data processing unit

(b) documentary research specialist to read and summarize documentary; and source.

(c) translator assigned to the socio-economic unit should be hired by August.

Suggested delivery Schedule/UM Socio-economic team

Date by which available	Non IVS	IVS	Integrated socio-economic report
May 31	Kekreti impact Balingo impact	1983 IVS in Banjul	Outline for draft report
June 30		1983 IVS aggregated (ready for analysis)	
July 31		1984 IVS in Banjul	
August 31	Migration-Senegambia Irrigation-Senegal (without IVS).	Draft-1983 IVS analysis	
Sept. 30	Irrigation-Gambia BWS-Senegambia delivery of supplementary qualitative (Natural Resources) Studies	1984 IVS aggregated	Draft integrated Senegambia report to Lagler (based on data available by 8/31)
Oct. 31		1984 IVS analysis draft	
Nov. 30	Marketing Senegambia		Final Senegambia Draft socio-econ. report
Dec. 31	BWS-Guinea	Terminate Guinea modified IVS	Translation of Senegambia report
Jan. 31			
Feb. 28	Marketing-Guinea Migration-Guinea	Modified IVS analysis for Guinea	Draft Guinea socio-economic report (with as little lagtime as possible + translation

II. C. River Resources Study

1. Procedure and Problems

Overall, the River Resources Team have completed most of the work described in the University of Michigan Workplan. The major exception is the portion on Guinea which although not scheduled to be done until June and September of 1984 could still be delayed depending on the political situation in Guinea. If working in Guinea is restricted, the team does feel they have enough data from their previous forays to make some general statements about the biology of that section of the river. Obviously, the river resources group should complete the field program in Guinea as much as possible. Although (due to the extreme difficulties of sampling in that region) the additional data would likely be more of the same, they will document the key variables in the Guinean portion of the Gambia river system during the rainy season rather than the dry season.

One major failing to date with the River Resources Study is the lack of hydrologic information about the river before and after the proposed dams (i.e. Balingo and Kekreti). Although described as part of the Workplan the Hydrologic information available to the River Resources Team is at this time virtually non-existent, despite the substantial number of hours allocated for hydrological study. The descriptions presented in Working Documents Number 8 (draft) and number 16 (final) are very preliminary and next to useless in providing the information (e.g. salt water mixing, flow rates, flow volumes, etc.) required by the biological team in performing their field work and analysis.

Evidently one reason for this shortcoming is the failure of certain equipment to arrive in time for the hydrologist to do his planned field work. Although unfortunate, management should have ensured the hydrologists (or a replacement) return to complete this work much earlier than the May 1984 period currently scheduled. In any case, more effort should have been spent by the hydrologist on interacting with the several engineering companies executing the feasibility studies (i.e. AHT and RRI; the hydrologist did visit Howard Humphries', Ltd.). The unfortunate consequence of this shortcoming is that the field design and its execution were done with very limited knowledge of the hydrologic system. This is an aspect of study integration that should have been initiated long before the biological field program.

Upon his return to Gambia in mid-May, the hydrologist has a large, critical task to complete in providing a quantitative characterization of the river's regime. This was discussed with the River Resources Team Leader who was well aware of the problem. In fact, the hydrologist is expected to present a detailed report on data which has been processed in the US. If at that time, it appears as it does now that the team still does not have the substantive hydrological information necessary for a good understanding of changes and consequences of the various development schemes, then additional time should be allotted to this portion of the river resources study.

As fundamental as hydrology is to river basin study, it is imperative that this analysis be as solid and comprehensive as the the existing data will allow; identification of limitations of the data base and recommendations on the need for further analyses and modelling should also be included.

2. Accomplishments against Goals

Generally it would appear that the River Resources Team will meet all of their goals as described in the Workplan although with some qualification. The most critical qualifier is the constraint imposed by a limited data base. Obviously one year's data are not going to answer all questions with equal effectiveness. The Gambia River system is complex and its dynamics are a result of processes operating on time scales of hours (e.g. plankton) to years (e.g. fish). Overall the River Resources Team arrived at a good balance between process oriented studies (e.g. rates of change, component interactions) and base line data (e.g. conductivity, nutrient concentrations). Their ability to carry this out in the lower and upper estuary was greatly augmented by the use of the research vessel Laurentian which although expensive greatly improved the team's ability to execute a more thorough study of the lower reaches of the river.

One criticism of the sampling scheme is the selected time interval between samples at any one location. Within any of the four characteristic "seasons" identified as appropriate for the river, only one set of samples was taken (i.e day flood, night flood, day ebb, night ebb). As a consequence the finer-scale dynamics of the nutrients and plankton which can change dramatically over a period of days were missed. Given the characteristic of the Gambia River's direction of flow in the lower estuary being primarily forced by the tidal cycles, it would seem reasonable to presume that a knowledge of these finer scale processes would be useful, especially when a major concern is identifying the major source of nutrients to the system.

Related to the above is the suspected importance of the mangroves to the overall nutrient dynamics of the upper and lower estuary. Although a mangrove study was executed it was more directed towards establishing their role in the production of fish (e.g. rearing, feeding, cover, etc.). The Study did not look at the bottom sediments both in the mangroves and the adjacent river banks to evaluate the quality and quantity of detrital decomposition.

Such information is certainly critical in establishing how important the mangrove system is to the primary end of the food chain. Some of the information collected (e.g. flux of organic material in and out of the mangrove; nutrient levels near the river bottom), however, will facilitate some estimations of nutrient flux and thereby enable the Team to identify the critical sources of nutrients to the riverine system.

One accomplishment of special note is the River Resource Team's fisheries economic analysis. Given the constraints imposed by a severe lack of historical data, the team did an admirable job of initiating a catch and effort study with representatives of the Fisheries Department in The Gambia that one hopes will hopefully continue after the Team leaves.

This work in combination with the questionnaire programs completed by both the River Resources and the Socioeconomic Teams should allow for some good analysis of the importance of the fisheries to the local and regional economy. It is unfortunate that the lack of historical records on fishing effort precludes the ability to use some of the analytic tools available that facilitate estimation of fish stock from catch and effort data.

3. Quality

Overall, the quality of the data and analysis executed by the River Resources Team is good. This is especially true in the upper and lower estuary where the use of the Laurentian greatly diminished the logistical problems and enabled the team to concentrate on the execution of the field studies. The baseline data collected match what is traditionally collected in such studies and state-of-the-art equipment (e.g. autoanalyzer, flurometers) was used. The quality of the work was also increased by the River Resources Teams' early attempts to integrate their Workplan by building a conceptual model of the river system to help them identify the key processes and interactions that comprise the aquatic system. Unfortunately, this exercise was not taken to the next step and provided with more rigor to provide a clearer specification of the underlying hypotheses and assumptions. The effectiveness of this approach was also limited by the lack of overall project integration which would likely have resulted in more coordination between the teams thereby ensuring parsimony in effort as well as recognition and quantification of the major linkages between the four programs.

Related to the question of quality is the training program established as part of the objective to institutionalize the analytic capability within OMVG and its member governments. In executing this task the River Resources Team did a good job and provided on-the-job training for six national scientists in the techniques and procedures of the river studies. The long term committments of these six scientists greatly assisted the River Resources Team and without a doubt greatly enhanced the ability of the team to meet its objectives. However, despite the success of this training activity within the river resources group, there are some criticisms that are relevant to the current project and to any future projects that include an institutionalization objective.

First and foremost, any training program must establish a balance between onsite technical work and the more theoretical concepts on which the field work is either based or which it is attempting to address. Apparently the River Resources Team (primarily because of time constraints) was not able to provide this theoretical background. As a consequence the trainees only have knowledge about how to execute the field and instrumentation tasks but little understanding of the study design or the eventual analysis of impacts and mitigation options.

There is a large lesson to be learned here. If training is to be a part of a scientific study of this nature (and it should be) then it must be taken far more seriously in the planning and execution of a project. It is unreasonable to expect scientists who are under fairly tight constraints to provide a scientific product to put great effort in planning a complete training program. Instead an individual should have been selected to work with the team from the beginning to facilitate the necessary blend between theory and practice and thereby structure a more complete and comprehensive program. Then the additional burden on the scientists would have been minimal and the trainees would have gotten far more benefit from the Team's presence. As it now sits, the trainees are grateful but frustrated. They feel technically educated but have no real concept about how one takes their results and relates them to the broader questions the data should address. This problem was exacerbated by the apparently unavoidable but unfortunate need for the fisheries data to be analyzed on a computer back in the United States.

If at all possible every effort should be made by the River Resources Team to attempt to close some of these knowledge gaps for the trainees. The Team's ability to do so, however, is frustrated by the termination of the trainees contract with the University of Michigan at the end of April. Given the enthusiasm of the trainees, the apparent successes of the training so far, and the fact that institutionalization is a major objective of this project, every effort should be made to continue the involvement of at least some of the trainees over the remaining few months. Further, a return (or extension of stay) of some of the River Resources Team members to continue the training program should be considered.

4. Utility

The data and analysis provided by the River Resources Team will certainly be useful to OMVG. A good set of baseline data has been created and a preliminary understanding of the major processes in the aquatic system will be established. However it should be kept in mind that any study of this nature is going to identify numerous critical uncertainties in both our understanding of riverine processes and their sensitivity to both natural and man-made variability imposed on the system. At this point it is not clear what key uncertainties will be identified but undoubtedly there will be many (e.g. the contribution of the mangroves to the nutrient dynamics). Therefore OMVG should not expect much certainly in the predictions of impact that will be possible from the University of Michigan Study. Each prediction will have suitable qualifications and should be viewed with suitable scepticism.

A related issue is the degree to which the fisheries study will incorporate the expected variability of the system (both natural and man made). West Africa is now experiencing a severe drought. As a consequence this study is being carried out in what we all hope is an unusual year (i.e. no real flood plain events occured this year).

Some attempts should be made by the River Resources Team to estimate how the dynamics of the system might change under different hydrologic conditions be they natural or man made. The success of such an analysis would be greatly increased if a more concerted effort could be made by the University of Michigan Project Management, OMVG, and USAID to access all the data and scenarios that have been assembled by the feasibility studies on each of the dams. Presumably variability in the rainfall patterns, and the possibility of using different operation rule curves were part of the analyses carried out by AHT and Howard Humphries Ltd. This variability must not be ignored in the ecological analysis . Variability plays a very significant role in any ecosystem's dynamics over space and time. Every effort should be made to understand its role in the Gambia River system and how altering that variability through impoundment will ultimately affect the key processes that now operate.

These concerns with system variability and uncertainty speak to the importance of developing a comprehensive monitoring program. It is highly probable that the monitoring program developed by the River Resources Team might be its most important product. If planned with due consideration of the important system processes and the identified uncertainties, the monitoring program should greatly assist OMVG in both addressing some of those uncertainties as well as detecting a change in the system before it becomes irreversible or mitigation is impossible.

Therefore despite the constraint on time available to the team, every effort should be made to ensure that the monitoring program is well thought out, and integrated with the other studies. Additionally the monitoring program must not just focus on the traditional system features that are fairly straight forward to treat (salinity, temperature, etc,) but also on the processes that are hypothesized to be the major driving forces and linkages in the system (e.g. rates of exchange between sediments, flux of detrital materials in and out of mangroves; predation pressures, fisheries catch and effort).

As noted above the study's catch/effort data evidently will not permit a thorough analysis of fish production in the Basin. Although some estimate of this nature will be attempted, it is recommended that the River Resources Team make use of some of the simpler models (e.g. morphoedaphic index) that have been developed to estimate fisheries production potential. Although these models are highly limited in their utility and ignore the dynamics of the system (e.g. total dissolved solids can be high and yet there still may be no fish in the system due to predation and/or overfishing), they can help to provide a first cut estimate of the system's potential.

Throughout all the interviews with the river resources team, it became very evident that everyone is under considerable pressure to complete the studies and report on schedule. A concern is that this need to get out the report before members of the team return home will be to the detriment of the completeness of the analysis.

Given the amount of data collected and the range of questions the Team has been asked to address it would be unfortunate if the quality of the analysis were not at the best possible level. Although the argument could be made that Michigan contracted to provide a complete study, the kinds of analysis to be performed were not spelled out in the contract or Workplan. Therefore accomplishment of this task requires the full cooperation and understanding of all those concerned and perhaps a restructuring of the budget. Alternately additional funds might be requested to accomplish this task. If this could be done as part of an extended training exercise then it has definite attraction.

II. D. Wildlife and Vegetation Study

1. Procedure and Problems

Despite valiant efforts by the Wildlife Team, many of the tasks described in their Workplan were fraught with problems some of which were unavoidable, others of which may have been avoided with better planning. To make this section of the evaluation clear, comments will be presented by task in the same order as presented in the workplan.

Task 1 Determine the status of existing Information

This task is basically complete and appears to have been accomplished satisfactorily. As a consequence OMVG should have a good set of historical data on wildlife and assorted maps available to its Planning Unit.

Task 2 Basinwide Ground Reconnaissance and Aerial Overflight

A three week on-the-ground reconnaissance was completed in early 1983 as part of a project team expedition designed to help each of the University of Michigan teams orient their final workplans. However the additional reconnaissance planned with aerial overflights did not occur due to a continual problem in getting access to a suitable aircraft. Evidently close to a person-month has expended over the last 12 months in attempts to charter a suitable plane and pilot with the appropriate permits, etc. As a consequence no aerial observations have been possible.

Task 3 Interaction with Socioeconomic Team for Information Acquisition

Co-ordination with the Socioeconomic Team has been varied in response and effectiveness. Although some meetings have occured, the result is far short of the original concept described in the workplan. Evidently the Wildlife Team assumed the Socioeconomic Team would look at all aspects of resource use and would therefore be more responsive to wildlife information with regards to their questionnaire design.

One unfortunate result is that a very limited amount of useful wildlife information will be available from the Intensive Village Surveys now being completed by the Socioeconomic Team.

As a consequence, the Wildlife Team is planning their own "hunting questionnaire" and survey in the May to August, 1984 period. Although this has been designed to mesh with the socioeconomic data base structure (at the request of the Socioeconomic Team), it will not be carried out in the same villages.

Task 4 Vegetation/Land Use and Wildlife Habitat Mapping

This task is proceeding smoothly and going well under the current constraints of time. The vegetation maps produced will be very useful products in basin planning. One concern is that the classification scheme was developed essentially in isolation with little contact with OMVG, the eventual users of the information. Also it would appear that the classification scheme emerged more out of the limitations of the Landsat medium chosen than from a more functional approach oriented towards the wildlife, socioeconomic and river resources information needs.

Tasks 5 Field Studies of Mammals, Birds, and other Terrestrial Vertebrates

Unfortunately this task, which in many respects is key for the wildlife study, has had numerous problems. For one, it still suffers from the total lack of aerial reconnaissance. The other major problem has been the uncooperative nature of the Director of National Parks in Senegal, who despite numerous attempts by OMVG and Michigan denied the team to access to the Niokolo Koba National Park until May, 1984. Given the fact that most of the wildlife left in the Gambia River Basin is primarily in the park this has been an unfortunate situation and the lateness of Park studies can only hurt the quality of the study. Moreover, the refusal by the Senegal Government to allow the team to use any tranquilizing technique as part of a capture-release and telemetry study for the larger mammels means that it will not be possible to gain a very good understanding of the migration patterns of the animals both within and outside the park.

Of all the techniques described in the Workplan only the visual surveys have to date been carried out with much success. Besides the initial reconnaissance survey in February, 1983, three other major trips were completed, two 2-week trips into eastern Senegal (Oct-Nov, 1983 and Feb.-March, 1984) and one 4-week trip into Guinea (Nov-Dec, 1983).

A second trip into Guinea was planned as part of the Senegal expedition but was prevented by the closure of the Senegal-Guinea border.One problem with regard to these field trips is the rather long period between the team's arrival in Banjul (June 1983) and their first field observation trip (late October 1983). Although it is recognized that considerable preparation time was required before embarking on any trip (to install winches and extra gas tanks on trucks, etc.) this four month gap in field work resulted in no wildlife observations during the rainy season.

Tasks 6 and 7 - Potential Impacts and Proposed Mitigation Schemes

At this time these tasks are still yet to be completed by the Wildlife Team. Despite the problems of executing some of the previous tasks, discussions with the Team members indicate these tasks will be successfully completed albeit with considerable qualification due to shortages in observation data.

2. Accomplishments Against Goals

Although a considerable amount of the Workplan is dedicated to the specification of the various field techniques to be used in the observation and study of the wildlife, the major stated goal of the Wildlife Study is to establish a habitat availability and utilization analysis for the wildlife in the Basin. Therefore a major task has been to establish accurately the location of the appropriate habitat types and simultaneously establish how effectively the wildlife utilize each of those habitats. The quality of the vegetation mapping in combination with the high degree of ground truthing would appear to satisfy the data availability requirement. The land type categories selected do generalize many of the more specific characteristics of wildlife habitat; however they evidently represent a categorization scheme that has in the past been used successfully in West Africa.

Relating wildlife to habitat will be possible to some extent from the field studies successfully carried out to date. However it is not evident from the information available that the wildlife and vegetation components were well co-ordinated with regard to their respective field trips. Although some attempts were made to coincide the wildlife observations with the systematic vegetation ground truthing activity, this was the exception rather than the rule. As a consequence there does not appear to be a good data base from which to observe correlations between vegetation and wildlife. Given that the major objective is to study wildlife through its relationship with available habitat, it is puzzling that these activities weren't better co-ordinated.

Whichever type of wildlife-vegetation linkage is used, the Wildlife Team must be sure to define the habitats it is assuming are related to the various land use categories within each region of the basin and show how the wildlife relate to these habitats. If this is not done precisely it may not be possible for follow-up studies by OMVG or others to match their results with those of this effort.

The major activity that appears to be limiting most large mammal wildlife populations outside the Niokolo Koba park is hunting pressure by the local villagers. It is for this reason that the failure of the Wildlife and socioeconomic teams to co-ordinate their efforts is indeed unfortunate. Although the Wildlife team will be executing their own hunter survey in the coming months it is second best since the requirements identified in the wildlife work plan covered far more than hunting activities.

Every possible effort should be made to integrate these data bases as much as possible. If this is not done, the effort and final products risk being incomplete in their evaluation of the possible threats to wildlife and the effectiveness of available mitigation schemes.

3. Quality and Utility

The land use/vegetation mapping component appears to be of a high quality, meeting all the criteria identified in the workplan. Considerable care is going into the map production and numerous field trips by both the forester and the wildlife team have facilitated a high degree of ground truthing. In addition the forester has developed a scheme for categorizing tree volume in the forested areas, thereby providing a measure of habitat quality and degree of cover provided by the overstory. This information in conjunction with careful descriptions of each of the mapped categories will provide OMVG with a very useful tool for long-term Basin planning, especially when used in conjunction with the Mark Hurd aerial photographs and maps.

This does however raise the issue of OMVG expertise and ability to use these products. Despite some attempts at recruitment, no trainees actually ended up working with the Land Use/Vegetation mapping team. Two were identified (one from Guinea, one from the Gambia) but they were not allowed by their governments to stay for any reasonable length of time. Consequently there are no resident experts in either OMVG or the member states totally familiar with the methodology and interpretation techniques used by the University of Michigan Vegetation Team.

Three basic reasons for this unfortunate fact appear to be:

(a) Evidently there are no well trained wildlife biologists available in the member nation government departments or so it would appear going by the trainees that were initially sent by the Member Nations.

(b) OMVG and the University of Michigan did not have a well thought out action plan for the training program. As a result misunderstandings resulted and a strong effort by both groups to ensure the program's success never materialized.

(c) The Member States were evidently not very committed to the training concept and therefore did not allow their trainees (in the case of wildlife) to remain with the team for a meaningful period of time. Why this was so different for the wildlife training effort when compared to the river resources trainees is not clear; although there is some evidence that the OMVG Planning Unit took a stronger role in helping the river resources group than the wildlife group.

This is a shortcoming that should be rectified as soon as possible. Evidently there is a Gambian, Abdullah Danso, in the Yumdum office of the Gambian Department of Forestry, Regeneration and Reforestation Unit, who has had training in remote sensing interpretation and mapping. Attempts by University of Michigan to get access to him via the Director of Mr. Danso's department have failed. Definitely OMVG and the University of Michigan should attempt to get Mr. Danso's involvement as soon as possible if the objective of institutionalization is to be realized.

Another source of expertise is the Department of Geography and Remote Sensing at the University of Dakar. Some contacts have been made by the University of Michigan with this group. Additional interaction should occur to ensure that OMVG can take advantage of the University of Dakar staff after the Michigan study team has left.

Evaluation of the quality of the Wildlife Study is not an easy task, as most of their data to date consist of field observations oriented towards visual and listening techniques that verify species presence and permit some evaluation of the animals age, sex, and possibly habitat preference. This information is recorded in trip log books and does provide a qualitative inventory of the species and their perceived relative abundances along the trip routes. The problem, however, is that none of the wildlife studies to date permit any statement regarding the dynamics of these populations over either space or time.

For example, the kinds of data that would be necessary to describe these dynamics are:

(a) reproduction rates of the population under various nutritional conditions;

(b) habitat and food selectivity under a variety of vegetation and prey conditions;

(c) migration patterns to evaluate utilization of habitats, urban and agricultural areas, and the Niokolo Koba National Park; and

(d) predation and hunting pressures.

A number of these processes should receive some coverage when the Wildlife Team finally visits the Niokolo Koba National Park, and secondly, if some capture-release experiments with the key wildlife species at least outside the park could be executed. Although not all of the more dynamic aspects of the system would be covered by such studies, they would enable what appears to be a dedicated wildlife team to structure a more complete analysis of the state of the wildlife in the basin. If these tasks are not accomplished soon, the Wildlife Team will be forced to rely on their experience, published information from other areas in Africa, and anecdotal information acquired through the questionnaire/interview procedure to be completed this summer.

4. Integration with the Final Report

At this time there is considerable opportunity to synthesize the Vegetation and Wildlife Studies into an overall integrated report. Both vegetation and wildlife are highly dynamic systems that respond to pressures imposed by shifts in the socioeconomic structure of the region and alterations in the river's hydrologic characteristics. To ensure that the final report represents a well integrated product, every attempt should be made to structure these linkages and thereby describe the processes that will result in direct and indirect effects on the wildlife and vegetation.

Obviously creation of reservoirs and associated urban development will result in destruction of vegetation in certain areas. However other factors that are not so obvious will also result in vegetation shifts over time. For example:

a) Population groups and the creation of new population centers due to the construction of dams and irrigation projects will greatly alter the intensity and location of the removal of vegetation for charcoal, or to clear land for farming activities.

b) Alterations in the hydrograph due to both flow regulation and natural variability will greatly alter the frequency and extent of flooding throughout the basin. This will have impacts on the river edge and flood plain vegetation (mangroves, sedges, etc.) in both the short and long term.

c) Changes in the sediment loads and deposition in the river and on the flood plain and the role it plays in altering successional sequence and soil fertility should be considered.

d) Use of fertilizers, pesticides and herbicides in the proposed irrigation projects could directly affect riverside vegetation through water quality or indirectly through gradual accumulation in the sediments.

One useful task that would help in answering some of these questions would be an analysis of vegetation changes that can be tracked in the aerial photograph records available for the Gambia (i.e 1946, 1956, 1968, 1972, 1982) and an attempt to correlate these changes with the available records on river flow, rainfall, and land use activities over the period of record.

Given a recognition of processes of this nature it should then be possible for the wildlife team to extend their impact analyses and mitigation/monitoring recommendations to include the various feed backs that may directly or indirectly affect the wildlife populations. It is only through a recognition of these system linkages and a co-ordinated effort by all the teams to integrate their ideas and data that a truly integrated document can be generated.

II. E. Public Health Study

This study represents the smallest of the University of Michigan/Harza efforts and the one to be based most on secondary sources. Its purpose is to analyze and set forth the prospective health impacts of proposed basin development investments, that is dam construction and resulting water management and irrigation development, and to outline mitigative measures and their costs.

The University of Michigan contract provides for one full-time professional, Dr. Curt Schneider, and a series of specialized short-term consultancies. As with the other three studies, work on Guinea was planned for and added in the field. But as extensive field work is not called for generally in this study, that has posed less of a problem for completion of analyses than has been the case with the other studies.

The Public Health Study has proceeded on the basis of the Workplan agreed with OMVG and USAID/RBDO in March, 1983. That lists eight tasks, which are discussed below. The emphasis is on water-borne diseases--their current incidence, likely increase or spread due to intended investments, and the steps necessary to reduce their impacts on expected human populations in the basin. At the suggestion of OMVG/RBDO, however, two tasks were added to the originally proposed Workplan (now Tasks Nos. 7 and 8), which go beyond this to treat rural water and sanitation and nutritional status generally in the Basin.

Tasks 1-4

These are Literature Search, Supplemental Field Research, Projection of Public Health Impacts, and Mitigative Measures. They will provide the bulk of the material, in one report, that will be of greatest immediate use to OMVG. The report should treat, by disease in rank order of importance and by sub-region of the Basin, the major health hazards and the methods of mitigating them. The report will confirm the danger of schistosomiasis. Indeed field investigations have discovered two snail vectors hitherto unknown in the area; Bulinus Truncatus, which would put settlers above the Balingo Barrage at added risk; and Biphilaria sp, which represents a potential problem following construction of the Kekreti Dam.

Other water-borne diseases that may demonstrate an increase due to proposed developments include, as expected, malaria, trypanosomiasis, other mosquito-borne filariasis, leishmaniasis, mosquito-borne viruses, yellow fever, dengue fever, hookworm, amabiasis and trachoma. Onchocerciasis (river blindness), which is prevalent in the Senegal portions of the Basin, is given secondary treatment in the study because of the existing work on this disease supported by WHO.

The leader of the Health Team, Dr. Schneider, is convinced that a thorough presentation, by disease, of dangers and responses to these will be assembled before he leaves the field at the end of May, 1983. The coverage of water-borne diseases in the Fouta Djallon area may not be as complete as that

for the rest of the Basin, as a proposed Terms of Reference for such a study was scaled down in funding from $460,632 to $151,388 "in light of reality and feasibility". But coverage otherwise of Guinean conditions appears to be as thorough as for Senegambia.

The study's treatment of mitigative measures will be perhaps the major contribution of the Health Team, and the managers of the Michigan contract should be urged to assure that as much detail as possible be presented. Judging from Working Documents so far available, specific disease problems will be related to stages of water control development (from pre-construction to habitation and management of irrigation schemes), to movements of population, and then to types of disease control measures. The last should be detailed by physical method, e.g. drugs, molluscacides, design and operation of water control facilities (including canal maintenance), and natural biological controls.

While this detailed and valuable contribution should materially help OMVG in its detailed planning for Basin investments, it is not clear from the relevant Working Document (No. 31, "Costs of Mitigating Measures for Public Health in the Gambia River Basin", by M. Makinen) or from work on Task 6 on Basin medical establishments (see below) whether or not the study will attach actual costs to necessary measures in each dam area. The Working Document roughly costs wells, health centers and other such infrastructure, but not campaigns and important recurrent operations (e.g. canal and brush clearance). To the extent population growth estimates for dam impact areas can be extracted from other studies, these should be factored into overall calculations of mitigative measures by area and development phase.

Task 5 - Institutionalization

This was intended to be a concurrent exercise to the research efforts contained in the other tasks. It promises to be a failure, as in varying degrees it is with the other Michigan/Harza studies. Whereas the Health Team has conferred with authorities in the three member countries, used their information, and explained what they were doing, training of host country personnel has not occured (none offered themselves). Even more so, OMVG itself has not had a professional technical input, nor has it received technical experience or training from the Health study. Such participation, may, in a sense, have been premature.

It is already foreseeable that as OMVG becomes more operational its Planning Unit will need to acquire technical expertise in the health field -- both for planning and operations. Regarding the latter, monitoring of health impacts can be expected to become a major necessity, for which OMVG should be a likely source of training and advice. At the appropriate time, Dr. Schneider's proposal that a training course in field vector identification for member country health personnel be undertaken , should be acted upon.

Task 6 - Medical Establishment in Member States

This was intended to set the organizational parameters and implicit developmental needs for carrying out the major portion of the recommended mitigative measures when dam construction begins and thereafter. It is expected that these burdens will fall on member-state health systems themselves, and so their current and potential capacities are important. Working Document No. 9 (" Material on Medical Establishments in OMVG Member States" by S. McAndrew) and a forthcoming one by E. Laurin on Guinea will provide the basis for this section of the Health Team's report.

Unfortunately, a comprehensive view which indicates in detail what the organizational (and budgetary) implications of major dam construction will be to the member states' public health bodies may not be possible. Working Document No. 9 is very thin on the functional realities of Senegambian health services. It is hoped that, from whatever source, the Health Team will be able to attach manpower and budgetary need estimates for each country's health service to its discussions of mitigative measures necessary at the various stages of Basin development.

Tasks 7 and 8 - Rural Water Supply and Sanitation and Nutritional Status

These two subjects were added to the body of Health Study more to round out a general picture of current and projected health conditions in the Basin than to support the central purpose of predicting water-borne disease problems and prescribe treatment for them. As such, short-term consultants have been employed to write discrete reports on each subject. They have not been completed. Rural water supply and sanitation will be treated by Dawda Jagne, Principal of the Gambia School of Public Health, who has been asked both to describe the current situation and, in so far as possible, recommend measures for water supply and sanitation improvement that will be most necessary in dam impact areas. Consultant Tonia Merick of Tulane University, will provide Working Document No. 34, a "Proposal for Monitoring Nutritional Status in Member States Utilizing Existing Agencies and Infrastructure."

In sum, the basic purposes of the Health Study should be met, and an essential guide to future decisions and actions provided in a coherent form. As the study was not intended to do extensive ground surveys of disease incidence, its results will provide a guide to future monitoring but not a base-line. Presumably at the appropriate times, in each affected area of the Basin, such base-line data will be collected and used subsequently by national health services to plan their services delivery. The Study will helpfully distinguish among disease threats at the various stages of basinal investment as these can be expected to affect construction, relocated and farmer beneficiary populations. Finally, as with the three other studies in the Michigan-Harza effort, it is not clear at this point the degree to which the material from the Health Study can be integrated into a holistic document (see II.E., below); this should be comparatively unimportant so long as clear indications of health problems and their costs are presented concerning the several intended major infrastructure investments in the Basin.

II. F. Conclusions

From the preceding sections it can be seen what an enormous job the environmental and socioeconomic studies have been, both organizationally and conceptually. Overall, the contractor has done a good job in fielding talented and hard-working individuals covering the Basin and developing important information. The numerous detailed recommendations for improvements and additions to the separate studies in the time remaining are presented above in a spirit of helpfulness, recognizing that at this point, even with a rearrangement of resources and a slightly extended time limit for the draft final report, only so much can be done.

The Evaluation Team has basically concluded that the studies, mutatis mutandis, will be sufficient as contracted for, such that neither a major contract augmentation nor significant problems with the product will eventuate. Two issues are summarized here: integration of the studies into the final report, and institutionalization (i.e. use and building upon them) of the studies and the data base generated by this component of the project.

1. Integration

It should be clear from the above discussions that most of the studies are in and of themselves of good quality, though some are delayed (Socio-economic, Guinea, hydrology). Perhaps the poorest, in its own terms, is that on wildlife/vegetation. As it was never intended so, the Public Health study does not provide and analyze basin-wide field data in survey form, and therefore does not contribute a detailed baseline for future monitoring purposes. Yet a massive, well-organized and unique set of information, analysis and advice will be provided.

The degree to which the various elements can be integrated with one another in a very useful way to provide an overall picture of impacts and basin systematic processes, however, is problematic. This is partly due to the original conceptual orientation and partly to problems of timing and logistics that have confronted each of the four teams.

As set forth in the UM Workplan, the plans for integration are very thin compared to the very detailed ones presented for each of the components. This follows faithfully the presentation of the project in the PP. The Integration Workplan is not only much shorter, but also much less detailed with regard to specific tasks and appropriate methodology than is the case for the four diverse field efforts. In fact, the actual model proposed for integration was one to be supplied by the economist technical assistant provided by the project to OMVG -- who left in the summer of 1983 not having supplied the model. It follows that little or no preparatory work on integrating findings was done prior to the planning of each study. So schemes for overlapping data, field work and essential focus were not developed and each study has gone its own way awaiting an integrative exercise just now beginning.

Thus it turned out that two different subjects have been treated in detail: direct effects of dam construction and resulting reservoirs on the natural systems, the main concern of the environmental studies; and the effects of the developmental projects that will follow (in particular the potential spread of irrigated agriculture), which is the main concern of the socio-economic studies. The Public Health studies overlap the two. This conceptual separation was not helped by practical problems of study implementation, such as pressure to mount studies quickly and the ideosyncratic management of each team whereby they tended to arrange direct access to additional expertise rather than cross reference with specialists from existing teams (socioeconomic using a Harvard pedologist, river resources getting an economist from CRED). The lesson: integration should be focused upon from the beginning if it is expected to obtain thoroughly at the end.

What may be most missing but on which the greatest attempts at integration should be made is the question of settlement/physical system linkages. That is as regarding, for example, fisheries, increasing fuelwood collection, soil fertility, and land availability, and effects of fertilizers, pesticides and herbicides on natural systems. It is presumed, though, that prior to the presentation of the results of individual studies, the final report will treat sub-regions where impacts and implications of dam construction will be felt. There the tradeoffs between socio-economic and physical effects can be described at least in qualitative terms (but certainly with some costing of alternatives and mitigative measures), and in ways that set the stage for serious consideration of options by decision-makers later.

Given the immense amount of work still to be done on certain individual studies, especially by the Socioeconomic Team, and the problems of completing the Guinea work, and even supposing the deadlines of the draft final reports are loosened as suggested in II,B, above, integration of findings will be rough. It would be most helpful if the Michigan team were to present to AID at the earliest possible moment an outline of the final report and the work it will entail between now and the end of the year. There should be a certain amount of latitude in the contract for movement of experts and refocusing of efforts. Refinements of certain elements of the socioeconomic opus may be less important, for example, than participation of the Socioeconomic Team Leader in the design and writing of the integrated portion of the final report. Jointly, UM, AID and OMVG should assemble to make tactical decisions, agreeing on the form of the final report (and plans for its institutionalization) very soon.

The departure of several Team Leaders this summer. The leaders of the project may wish to consider bringing together all the Team Leaders in Ann Arbor in September (Drs. Lagler and Derman coming from Banjul) to scope out the integrative chapter's content. Drs. Ames, Moll, Schneider, Gilbert and Mathes (the intended master editor) would be in that vicinity. Subsequently, the period from October through December could be spent in Banjul among Lagler, Derman, Gilbert and Mathes assembling the report.

III. EXECUTION OF THE MAPS

A. Design

To meet its institution-building purposes of the project, the Project Paper called for certain technical studies to assist the OMVG to design, analyze, monitor and develop its program. Basin-wide aerial photography and mapping was included to "provide detail not presently available, but necessary for identification of potential structural sites and irrigable areas; soils interpretation and productivity information; current and potential land use and land use conflict areas; demographic and migration patterns; and surveys and analyses concerning livestock, forestry, transportation and environmental factors."

The existing topographic map coverage of the Gambia River Basin was adequate for only very preliminary planning studies. The maps of the Senegalese portion of the Basin were at a scale of 1:50,000, but without elevation contours. Aerial photography at a contact print scale of 1:25,000 and planimetric land classification maps at the same scale were prepared for the Gambia in 1981 under the AID-financed Mixed Farming Project. The mapping under the OMVG project would not duplicate this prior mapping and would provide uniform basin-wide maps.

Therefore the Project Paper called for the preparation of controlled planimetric photomaps at 1:25,000 scale and selected topographic orthophotomaps at a scale of 1:10,000. For these, the Basin area would have to be flown at a contact print scale of 1:50,000 and in a selected area at a scale of 1:25,000, using both panchromatic black-and-white and color infrared photography. Ground control surveys would be performed to ensure adequate horizontal accuracy of the planimetric photomaps and vertical accuracy for the topographic orthophotomaps.

The photomaps would be prepared using panchromatic photography, and prints and transparencies of the infrared color photography would also be provided. The Project Paper foresaw two contracts, one of eight months for the aerial photography and another of sixteen months for preparation of the photomaps.

In general the design of this component was straightforward and well-thought out. The technical analysis in the Project Paper provided a description of the necessary inputs in considerable detail. Certainly, this technical detail facilitated drawing up the scopes of work and budgets for the necessary implementation documentation (PIO's, and contracts). However, two aspects in the design of this component are curious.

First, the Project Paper notes the 1:25,000 planimetric, land classification photomapping of the Gambia which was planned in the Mixed Farming Project for 1980-81. It states that the OMVG photomapping would not duplicate this, without any further explanation. However, the OMVG project has been under consideration since 1975-7 and an AIP for photomapping was discussed in 1979. Yet no attempt was apparently made then to link the Mixed Farming and OMVG aerial photography activities. The large potential savings ($1 million plus) would have been good cause for close, coordinated planning of the design of the two projects.

Secondly, the need for this multi-million dollar investment in aerial photography and photomapping is not particularly well-justified in the Project Paper. The report of the UNDP Multi-donor Mission and subsequent Action Plan only specify the need for 1:50,000 and selected 1:10,000 mapping of the Gambia River Basin. The Project Paper had little discussion of the informational utility of mapping for land use, water resource or river basin planning or of prior AID experience; nor any specificity on where the photomaps would end up and who would use them. Mention was made of short-term instruction for national personnel in aerial photo and photomap interpretation, but without any further specifics. Storage requirements were also described, but again without specific project actions. This is highlighted here because these omissions in the project design led to a lack of focus on end use of the aerial photography and photomapping in the project's efforts towards institutional development.

B. Implementation

The execution of this component is probably best examined by first listing all of the major actions to date:

May 1981: Project Paper approval

June 1981: Project Agreement signed

Dec 1981: Original PIO/T for $1.0 million for aerial photography and described photomaps as in Project Paper

PIO/T for PASA with Defense Mapping Agency for photogrammetry assistance.

Jan 1982: Contract signed for $1.8 million with Mark Hurd Aerial Surveys, Inc.

PIO/T Amendment No.1 increases scope of work by adding topography and increasing ground controls

Apr 1982: PIO/T Amendment No.2 adds $500,000 for second flying season

Apr-June 1982: First season of aerial photography (24% coverage)

Aug 1982: PIO/T Amendment No.3 adds $2.5 million for new scope of work and extends completion date to December 1984

Nov-Dec.1982: Second flying season completed

Feb-Apr 1983: Inertial surveying completed

PIO/T Amendments Nos.4-7 add approximately $70,000

July 1983: First aerial photographs delivered to OMVG

March 1984: First photomaps delivered to OMVG.

A map of the Gambia River Basin showing the lines of accepted aerial photographs and control points, and a chart showing the completion of aerial photographs follow. To date all of the aerial photographs and associated photographic materials have been delivered to OMVG by Mark Hurd. A first, partial shipment of photomaps has also been delivered to OMVG.

At the outset of the implementation of this component there were some misunderstandings over the quantity and precision of the aerial photography and mapping to be done . The Project Paper, the original PIO/T and contract specified aerial photography at a scale of 1:50,000 for the entire basin and at a scale of 1:25,000 for a selected (70 000ha) area. These aerial photographs would then be processed into 1:25,000 planimetric photomaps for the entire basin and 1:10,000 topographic orthophotomaps for the selected area with appropriate ground controls. As stated in the Project Paper, these scales and this coverage are considered sufficient for preliminary river basin planning. The Project Paper had budgeted almost $5 million for this scope of work, a considerable over-estimation since the initial basic proposals for this contract came in at less than $2 million.

Meanwhile, the OMVG had requested that the aerial photography and mapping be modified to include 5-meter contour lines for the entire basin, in other words that 1:25,000 topographic orthophotomaps be produced for the entire basin. This requires a substantial increase in vertical precision and controls (topography) in addition to the originally planned horizontal precision and controls (planimetry). This increases costs substantially, but results in mapping which is accurate enough for project study at the pre-feasibilities, and even feasibility levels, but beyond the general planning and identification purposes described in the Project Paper. The increase in costs due to the addition of this topography for the entire basin was about $2 million, raising the total cost to about $4 million. This was, however, still well within the $5 million budgeted.

As noted above by PIO/T Amendment No.1, AID changed the contractural scope of work at OMVG's request. Several other major changes were also incorporated at about the same time:

- More exacting ground controls with inertial survey methods for the accuracy required in topographic mapping;
- Division of the selected 70,000ha area into six different sites spread throughout the basin; and
- Addition of a second season of aerial photography due to late contract startup and weather conditions.

Two aspects of this sequence of events are noteworthy. First, there were apparently no technical discussions on the merits of these significant changes in the topographic precision for the aerial photography and mapping, and consequent large increase in cost. Regardless of the generous budget projected for this component, these large changes in the scope and cost of the

mapping should have been supported by some technical analysis and approval. Fortunately, the OMVG knew exactly what it wanted; the more accurate mapping will be a highly cost-effective investment for ongoing studies, even if it exceeds the uses foreseen in the Project Paper.

Second, some contracting difficulties did arise. Delays in the preparation of the PIO/T and contract slowed start-up, resulting in the need for a second season of aerial photographs. Of course, these preparations were complicated by the multiple locations of the parties involved: the contractor was in Minneapolis, project management in Dakar, the technical advisor in Washington, and the contract officer in Abidjan. In light of the final approval of the contract in January, a season well known for hazy "harmattan" conditions in the Sahel, it would have been more cost-effective to postpone contractor mobilization for aerial photography until later in the year. As it was, of the 30 days of jet aircraft stand-by during this first season, only eight days of high-altitude aerial photography were possible. Also, the low-altitude photography began early in April resulting as well in considerable down-time due to hazy weather conditions. Pressure from the OMVG to obtain aerial photography as soon as possible for ongoing feasibility studies was apparently responsible for this expensive rush to complete whatever photography was possible early in the year.

In the end, considering the technical and logistical complexity of the aerial photography, the operation appears to have gone remarkably well. Unexpected, but inevitable problems did arise: delayed country over-flight permissions, serious illness of key technicians, sub-contractor disputes, helicopter damage, and AID-contractor misunderstanding all appear to have been resolved expeditiously and amicably. This is a result of three factors.

Foremost was the recruitment of a technical advisor specialized in photogrammetry, as was wisely foreseen in the Project Paper. This adviser, recruited through a PASA from the U.S. Defense Mapping Agency (DMA) was centrally involved in the review of proposals and contractor selection. He advised AID project management on contract changes, work progress, and field problems, and also inspected and approved all photographic materials from the contractor before delivery to OMVG. This provided a continuity and quality of technical monitoring and control seldom achieved in development projects. This PASA represented a highly cost-effective 1/2% investment in this $4 million product.

Secondly, the contractor established a regional office in Dakar. Having a representative in the region, especially Dakar, greatly facilitated dialogue and the resolution of problems. Finally, but as importantly, AID has a management team composed of a direct-hire project officer and a deputy project manager provided under contract, both with a conscientious problem-solving orientation. Few projects are fortunate enough to have such continuous and intensive management.

Mark Hurd's contract performance is considered to have been superior. AID project management, the OMVG, and member-statetechnical staff involved with Hurd are unanimous in their positive appraisal of their work. Project documentation indicates that Mark Hurd was forthright and articulate in justifying contract requirements and the need for adjustments when expectations or circumstances changed.

Despite almost continuously hazy conditions, Mark Hurd managed to produce aerial photographs of acceptable quality. The photogrammetry adviser gave the following assessment in his report of March 1983: "Acquisition of aerial photography of quality resolution at the project scale of 1:50,000 has been a difficult task (due to the dust haze conditions). The twenty-four percentage completion of the first (half) season was of an average quality. Quality of the second season (1982-83) photography is also of average quality for the majority of the basin. The area in the extreme Northeast is considered marginal photography and has been accepted based on enhancement tests performed in Mark Hurd's Minneapolis facilities. A successful completion of the basin photography would not have been possible otherwise. Enhanced sample diapositives were produced from this marginal photography and furnished to USAID/RBDO and OMVG for review." This is a more discriminating assessment than that given by others. The major users at the aerial photos to date, a survey firm and a forester, (see C. Utilization, below) have found the photographs to be of good quality and definition, and certainly adequate for the purposes of their respective studies.

The DMA photogrammetry advisor also spent four days reviewing all of the orthophoto to reproduction products for preparation of the 1:10,000 and 1:25,000 scale photomaps at Mark Hurd in Minneapolis. This included inspection of relief, matching of detail between adjoining sheets and names information. He considered all 70 sheets reviewed of acceptable quality after the completion of some cosemetic corrections.

To date the photographic materials delivered to OMVG are the following:

- 10 each of the BW contact prints from the 1:50,000 scale photography
- 4 each of the BW contact prints from the 1:15,000 scale photography
- 30 sets of photo indexes
- 6 each of the color infra-red contact prints
- 3 each of the color infra-red transparencies.

Several dozen boxes of photomaps have also been delivered, but are as yet unopened and unverified.

C. Utilization

The aerial photographs which have been produced by this project are already in limited use in several Gambia River Basin studies. A selection of the 1:50,000 aerial photos was sent directly to Haumann and Zuelsdorf, the German survey consultants working on the feasibility study of the Kekreti dam. A project engineer associated with this study stated that the use of the aerial photos has enabled a multi-million dollar savings in the design of the Dam.

The forester and wildlife specialists on the staff of the UM/Harza study have also made use of the aerial photos. The American Embassy in Banjul has requested certain copies of the photomaps. Since the aerial photos have not yet been filed and indexed, considerable technical staff time is required to sort through and select the relevant photos for these users.

Now that many of the photomaps have also been delivered, a number of on-going studies would also benefit no doubt greatly from their use. For instance, the specialists of the UM/Harza study have expressed interest in the photomaps, and their need is immediate as their study enters its final integrative phase this year. A number of consultants and consulting firms (e.g. LRDC) would likely also be interested. Unfortunately, as long as the photos and maps remain unordered and crated, access remains limited.

The use of the aerial photos and maps by the member states is another matter. So far, although sets of the aerial photos have been sent to each, there is no evidence of their use. In addition to difficulties in accessibility (i.e. storage and filing), it is doubtful that the appropriate technical specialists in the member states either know of the photos and maps or how to use them to gleen information relevant to their respective sub-sectors. Utilization of the aerial photos and photomaps will depend on user knowledge as well as on accessibility. These two issues will be addressed by examining training and storage needs.

Training:

As noted in the discussion on the design of the photomapping component, two types of limited, short-term training were planned in the Project Paper. First, survey technicians from the member states would be included on-the-job by the contractor to observe the aerial photography and ground control operations and work with the contractors technical personnel. Secondly, a one month seminar would be held for appropriate OMVG and member-statepersonnel in aerial photography and photomap interpretation. The type of training which was actually undertaken differed considerably from that planned, however.

The training was added to the aerial photography and mapping contract (as recommended in the Project Paper) and was therefore also conducted by Mark Hurd. It consisted of the following:

Several weeks of fieldwork in which survey technicians from each member-stateaccompanied and assisted the contractor's mapping crew in toponomy, i.e. determining and correcting place names;

A three-day session in Dakar for six surveyors and cartographers from the member states and several OMVG staffers on aerial photography mapping operations and uses; and,

A one-month visit to the contractor's facilities and several state and federal agencies in the U.S. for the survey directors from each member-stateand OMVG to learn about methods of aerial photography processing, photomap making, and various end uses. The names of the participants for the two latter activities are listed in table 1, below.

The consensus of the several OMVG and member-stateparticipants interviewed , as well as that of AID project management, is that these activities were well-organized and effectively carried-out by the contractor and the sessions and visits were interesting and informative. Language was an impediment for the Senegalese and Guinean participants during the visit to the U.S., however.

Table 1. Training Participants

Session in Dakar:

Massaer MBaye	- Senegal, SGN
Ndoude Seck	- Senegal, SGN
E.S.O. Cham	- Gambia, Survey Dept
B.B. Barry	- Gambia, Survey Dept
Ibrahima Ba	- Guinea, STN
Mamadouba Camara	- Guinea, STN
Alphonse Loua	- OMVG, Infrastructure Div
Dawda Diawara	- OMVG, Infrastructure Div
Idrissa Samba	- OMVG, Planning Div.B
Boubacar Ba	- OMVG, Planning Div

Visit to the U.S.:

Najim Gissé	- Senegal, Director, SGN
Mahtar Jobe	- Gambia, Director, Survey Dept
Saa Sandouno	- Guinee, Director, STN
Mamour Gaye	- OMVG, Technical Director

These training activities differed substantively from that proposed in the Project Paper in two ways. First, the inclusion of member-statetechnicians in the actual aerial photography and ground control operations was deemed impossible by the contractor. This was understandable due to the logistical complexity and small aircraft involved in the mapping and inertial survey control operations. Therefore, the on-the-job training consisted solely of working with contractor field crew in determining accurate place names for the maps. This was less than desirable but it appears that the project designers were somewhat unrealistic in their expectations of including trainees in the aerial photography and ground control operations.

More importantly, the sessions in Dakar and the visit of the United States were not specifically directed at utilization as had been intended in the Project Paper. The Technical Analysis, Annex G states that "two instructors will provide training for OMVG personnel and host country nationals in the use of the completed photographic materials." The emphasis is on use, and rightly so. But what the project has provided is for the most part information on photo and map production to the map producers, the survey and cartography personnel. Several of the sessions and visits were on photo and map interpretation and use (e.g. a lecture by the UM/Harza forester, and a briefing by the U.S. Forestry Service) and some of the participants were OMVG planners. Yet, the focus was not specifically on use and users.

The highest returns from this $4 million investment in photomaps will not only be realized in information for studies by European consulting firms, but in informed dialogue and planning by the land and water use specialists of the OMVG and member states. To this end, more user-oriented training is still necessary to educate sub-sectoral specialists on the interpretation of these valuable maps. AID should therefore organize and finance additional training on the interpretation and use of the photomaps, as originally envisioned in the Project Paper.

The training should be in the form of intensive workshops and involve potential map users in as many sub-sectors as possible (e.g. irrigation, livestock, population). This could be accomplished by holding a series of half-day sessions in each member-stateto allow and encourage a wide participation while limiting disruption of government operations . The content of the workshops would concern how to interpret and analyze the project's topographic orthophotomaps to obtain information on land and water use for treatment of various sub-sectors, including wildlife, fishery, forestry, hydrology, transportation, and population. The workshops should be organized and conducted by a panel of sub-sectoral specialists skilled in photomap interpretation.

Some of these specialists could be from U.S government agencies, while others could be recruited locally (University of Dakar, the RSI Satellite Imagery Unit, the Mixed Farming Project/Gambia, etc.). The workshops would extend over six to ten days, in each member-stateas well as at OMVG. Participants would be 15-20 personnel working in the aforementioned sub-sectors.

Organization of these workshops may be an additional burden on project management and may be costly due to the logistics and to the number of sub-sectoral specialists involved. However, the potential return in the promotion and use of this valuable and expensive planning tool more than justifies the effort and additional expense.

Storage:

All the sets of aerial photographs and associated photographic materials have been delivered to the OMVG , and sets distributed to each member state. An initial set of photomaps has also been received by the OMVG.

There are no adequate filing or storage facilities for the aerial photos or photomaps at the present temporary OMVG offices, and only minimum facilities at the survey departments visited in Senegal and Gambia. At the OMVG offices, most of the materials have been left in their boxes and variously stacked in several different rooms. In Senegal and Gambia the aerial photos were stacked on shelves in office-storerooms. None of these rooms was well enclosed or air-conditioned. Although not planned in the Project Paper, AID project management has taken the first steps towards ensuring acceptable storage of the materials; recommendations on filing and storage were requested and received from Mark Hurd in February. Implementation of these recommendations have been discussed with the OMVG and the Evaluation Team.

Obviously, the photos and maps represent a substantial investment of development funds. And Sahelian West Africa is clearly a harsh environment for photographic materials. Controlled storage is vital in order to safeguard this investment in these conditions. In retrospect, and unfortunately left unsaid in the Project Paper, no photographic materials should have been delivered until controlled storage was available and inspected. Immediate action should now be taken to ensure the safest possible temporary storage for these materials .

First, before any future deliveries of materials are made, the sets of aerial photographs and photomaps at the OMVG offices should be a consolidated and transferred separate room which is well-scrubbed, and cleaned, shuttered against sunlight, totally-enclosed, weather-sealed, air-conditioned, and not used for any other purpose. Two staff members should be named responsible for the photo and map sets and this room. Then the OMVG should expedite the planned recruitment of a Documentalist who would, among other duties, be responsible for the safekeeping and filing of the photo and map sets. Each member state should also be requested to name the staff person directly responsible for the storage and filing of their sets of photos and maps.

To ensure permanent controlled storage in the longer-term, several direct actions should be taken by AID:

1. Metal flat files should be purchased, locally if possible, for the OMVG and each Member State. The model specified by Mark Hurd (Hurd-Lucke letter, 1/31/84, Pg.2, Para.2) appears appropriate, although at least two copies of each map should be available in the flat files at OMVG, necessitating either twice as many drawers or two flat files. However, since the OMVG and member states will also need to file other basin-related maps and plans three flat files for the OMVG and two for each member state would not be excessive.

2. The installation/renovation and furnishing of a spacious map room for OMVG and smaller map storerooms for each member state should be required and financed. The ideas outlined by Mark Hurd in the aforementioned letter can serve as a basis with the following modifications:

- A floor space of $25m^2$ for a map room and half as much for a storeroom should suffice;

- The open wood storage should be enclosed with side on rear panels and front doors;

- The map storerooms for member states will require only about half as much as storage volume and no desk or tables.

The map and storage rooms should have tight roofing, door and windows well-sealed with weatherstripping, and two air conditioning units. Letters could be sent to the OMVG and survey departments of the Member States requesting plans following the general parameters above. The work could be most easily financed through a F.A.R system with appropriate AID engineering approvals.

3. Upon completion of the maps and storerooms, a map librarian/documentalist technical assistant should be contracted for two-three months, most likely through a PASA with one of the U.S mapping agencies (USGS, DMA, USAMS,etc). The scope of work : to set up the OMVG and member state map and storerooms and files, and train the OMVG documentalist and appropriate member state staff in photo and map storage, care and filing.

Finally, the establishment of an accessible map room, indeed the entire documentation center, will be an additional charge to the OMVG's already-strapped operating budget. These photos and maps as well as other documentation are themselves valuable resources which will enable consulting firms to save time and costs on their studies in the river basin. It is not unreasonable to expect these firms and other consultants to spare the costs of photo, map and document collection indexing and storage. Therefore, private firms and consultants should be required to pay a reasonable user's fee which would be deposited in a special operating fund for the documentation center and map room.

The actions described above should ensure the best possible access and preservation of these costly aerial photos and photomapping products.

D. Conclusions

The aerial photography and mapping component of this project has worked out well. In the first place, the design of the component was technically-sound, if somewhat narrow. Coordinated planning with a similar project would probably have resulted in substantial cost savings, and more specific thought on post-production utilization of the materials would have promoted wiser and wider use of the product. Yet, this component had most of the necessary technical ingredients for success.

Despite the inevitable problems with an operation of this scale, implementation was generally well-managed by all parties involved. Delays in start-up and pressure to rush the photography proved to be costly, and no technical analysis supported the substantial intensification of the contractors scope of work. The accuracy of the aerial photos and photomaps produced is greater and probably more useful than that specified in the Project Paper (which, however, contained a huge over-estimation of costs). Recruitment of an experienced technical advisor for the photography and mapping was a key in assuring that all went well. The performance of the contractor is rated high. The aerial photography and photomaps are of acceptable quality despite marginal weather conditions. All photos and some maps have been delivered to OMVG at this point.

The utilization of the aerial photography and photomaps is a major issue. The aerial photos have already been used by consultants working in the Basin. Utilization of the photos and maps by member state cadre will depend on their understanding of the informational value of the maps and techniques to extract same. The training furnished was oriented towards map and photo production and producers, so additional in-country training seminars are still necessary to reach photomap users and promote photomap use.

OMVG and Member States do not have adequate facilities for indexing and storing the aerial photography and mapping. The project should insist on adequate temporary storage for the materials, and initiate and finance the establishment of controlled map rooms and storerooms. User fees from consultants using the photomaps would provide a small fund to ensure continued safekeeping of the photos and maps.

IV. FUNDAMENTAL CONCLUSIONS AND ACTION RECOMMENDATIONS

A. Fundamental Conclusions

On the whole, the project has been successful in its first phase. It is well managed, given the magnitude and diversity of inputs, the logistical difficulties of studying the basin, and the natural growth pains of a new institution like OMVG charged with such important tasks. The management by USAID/Senegal/RBDO, in particular, has been highly professional and devoted. The project in its original terms is within the budgetary and time limits set for it. As planned by project management, this mid-term evaluation has come at precisely the point where decisions should be taken on continuing and enhancing support that builds on achievements to assure fulfillment of the project's purpose.

In the first two years of actual project operations, beginning with contractor selection and commencement of mapping, it has been unavoidable that implementation has concentrated on mounting the massive environmental and socio-economic studies and mapping exercise. The very high quality maps are now being delivered and have already been of value in informing certain engineering planning decisions. The studies will be completed by early 1985. There have been certain problems in their execution, both managerial and substantive, but these to a great extent are being overcome.

Specifically, completion of the final integrated report in its most useful form may necessitate both a rescheduling of the time of certain team leaders and extension of the due dates for the reports. In this manner, use of the massive socio-economic data base being compiled will be optimized, and more complete data on the Guinea portion, as provided for in a later contract amendment, can be fully included.

This has been a period, also, in which the technical assistance provided to the OMVG has been employed, for the most part unavoidably, in assisting and advising execution of the studies and maps as well as establishing technical relations with member state agencies. The problem here is that the technical assistance team has been extremely incomplete. The river basin planner, who should have served the function of chief of party was not appointed; instead the UNDP provided a Chief Technical Advisor to OMVG, but he has not served the purpose of leading the integrative technical work of the Planning Division. The post of economist has been vacant for nine months. The result is that the Planning Division has been in a reactive mode and has not taken the leadership role intended for it. Long-term training for counterparts has also not followed the intended sequence, so that it will be more difficult than expected to combine overseas studies with substantive work of the Division in the coming two years.

To a certain extent, the above inadequacies are attributable to an original design fault which can and should now be corrected. This is that the project design failed to provide a plan or concept for the evolution of a planning operation in OMVG.

The project's purpose, to establish an effective planning division by the end of 1985, was set up to be achieved by simply providing self-directing experts and training. Their goals and positions within a dynamic and growing organism with specific functions and targets were not specified. Thus, too, certain technical expertise necessary to a planning operation was not included in the technical assistance package (and has not been provided by other donors), notably in the fields of hydrology, irrigation planning, public health, and development project finance and management.

It is not surprising, therefore, that what actually constitutes the strategic planning process of OMVG draws very little on the Planning Division, as it currently exists. The OMVG is following the Action Plan of 1982, provided with the support of the UNDP, and is in the process of revising its basin-wide production model and set of regional and national project prospectuses, while at the same time seeing to the completion of a series of feasibility and water resource studies supported by other donors. Within about ten months those exercises and the Michigan studies will all be completed.

That is the point, the beginning of 1985, at which the planning operation of OMVG should take a new and more ambitious course. The continued, and indeed, the increased commitment of the four member states to the importance of the development of the Gambia River Basin and to the central function of the OMVG will be a prerequisite to such an enhancement of functions and responsibilities, as will be increased donor coordination.

But the opportunity and necessity are there. As the major donor to the OMVG, AID should encourage the member states and officials of OMVG to set forth in detail their plans for carrying out the process of basin-wide development decision-making in the next two to three years. On that basis, AID should be prepared to provide additional resources for the project which should then run until the end of 1986.

The conclusion here is that a strategic decision process will require a fully operational well-equiped planning unit in OMVG, positioned to answer directly to the High Commissioner and Secretary General. The purpose of this planning unit should be to gather and synthesize all the essential information bearing on environmental, socio-economic, and financial implications and impacts of possible basinal development efforts and to present options to the decision-makers with increasing refinement beginning in mid-1985.

To achieve this, the current AID project would need to be amended to add inputs necessary to the achievement of its original purpose. OMVG and its Council of Ministers would have to support this evolution of the Organization's planning operation and unit both in principle, with specific instructions and mandates, and in terms of member states' financial and personnel contributions. Both appear to the evaluation team to be desirable and feasible.

In that light, Section IV.B., below, sets out a series of action recommendations directed at both AID and OMVG concerning the staffing, functions and facilities of the Planning Unit and future steps in AID project management. As a whole, they call for the completion of staff and facilities of a central planning unit and operation of the synthesis and options-presentation process described above through 1986. They follow from the detailed analysis of the OMVG Planning Division's institutional development presented in Section I, above, and reflect certain conclusions about the execution of studies and maps contained in Sections II and III.

Principally, the recommendations indicate an increase in OMVG and project technical assistance staffing for overall planning and synthesis, hydrological modelling, data base management and additional special studies. Training needs to be reformulated and increased slightly. Facilities for documentation, maps, data processing and environmental monitoring, using inputs already largely provided by the project, need to be set up and made operational. Finally, it is recommended that an integrative exercise be undertaken, assisted by modeling and presentation experts to be contracted for by AID, which would both clarify development options for decision makers on the basis of the enormous amount of information OMVG will have gathered by early 1985 and provide analytical and presentational tools useful for later phases of river basin planning and development.

An increase in project funding of ten to 15 percent is recommended, along with a three month extension of the Project Assistance Completion Date (PACD) to December 31, 1986. The latter would synchronize the AID project's timing with that of institutional assistance from UNDP, setting the stage for consideration of later multi-donor assistance. The former is a modest immediate increase in AID assistance that should be cost-effective. It would be instrumental in achieving the project's, OMVG's and the member states' important and realizable objectives as the pre-investment phase of basin development is completed.

IV. B. ACTION RECOMMENDATIONS

1. Staffing of Planning Unit

a) River Basin Planning - The position of chief of the Planning Division should be filled by a qualified member state national. The project should provide an experienced river basin planner technical assistant for two years beginning no later than December, 1984. He or she, with the Planning Division chief, should direct the integration and synthesis of all river basin information for presentation to member states and donors. The existing river basin planner counterpart, Mr. Ba, should go for training in hydrology following a year's English language training.

b) Hydrology - The project should provide an hydrologist technical assistant for at least one year (long or recurrent short-term) to develop an hydrological model of the Basin and integrate it into the larger modelling exercises.

c) Economics - The newly recruited economist technical assistant and his counterpart (to be provided by OMVG) should aggregate all economic information collected by OMVG into the overall integrative tasks of the Planning Unit and execute and/or direct short-term technical assistance to implement special studies: inter alia, on financial implications of river basin development, the economics of irrigation schemes, and opportunities for economic cooperation among member states.

d) Environment - The environmental technical assistant should be extended to the PACD to remain in place until the counterpart returns and to assist in general data integration for planning, vital environmental impact mitigation analysis and establishment of an environmental monitoring policy. His counterpart should begin 18 months of training in the U.S. as soon as possible in order to return by 1986.

e) Sociology - The technical assistant should remain in place until his counterpart returns from 18 months training and there is an overlap of at least three months.

f) Data Management - A data base management expert familiar with the design and content of the Michigan data base should be provided for one year to ensure its integration into larger modeling exercises, train staff in its use, and oversee the installation of the OMVG's computer facilities.

g) Development Project Analysis - The OMVG should be requested to extend Mr. Kane's assignment and give him responsibility within the Planning Unit for coordinating analysis of all currently active and planned development programs in the Basin and their relationships to interventions being planned by OMVG.

h) Documentation Center - A qualified member state documentalist should be recruited at once to begin establishment of the documentation center including the safekeeping and filing of maps and photos. Short-term technical assistance should be provided, as necessary.

2. Functions of the Planning Unit

a) OMVG should undertake an objectives-setting exercise concerning its planning operation involving the concluding supervision of studies, the integrative exercise and the preparation of the Revised Action (Integrative) Plan. The result should be an integrated work plan for the Planning Unit from which each person would develop his or her specific tasks.

b) On the basis of this work plan, when additional technical assistance and counterparts are in place, the current Planning Division should be converted into a Planning Unit under the direct supervision of the High Commissioner and Secretary General so that its higher and more central function is differentiated from the tasks of the more narrowly technical and operational agriculture and infrastructure divisions.

c) An integrative exercise, on the model of Adaptive Environmental Assessment and Management, should be planned and funded by the project. It should involve major member-state decision makers, as well as OMVG staff and consultants, and occur in the Spring of 1985. Its products, in the form of reports, audio-visual displays and the like, should be widely disseminated in the Basin.

d) In-country short-term training for OMVG staff members at African institutions (ENEA, ESGE, IDEP) should be explored as additional staff-building opportunities. Its timing and content should be coordinated with completion, review and presentation of both the Michigan draft final and final reports and the subsequent OMVG 1985 Indicative (or Action) Plan.

3. Facilities of the Planning Unit

a) Documentation Center - With the assistance of the data management technical assistant, this should be established to store the Michigan data base for retrieval on specific analysis tasks. It should be provided with a local currency account under the supervision of the OMVG accountant with additional financial management training under SRFMP as necessary and this fund used to procure essential documents locally. A foreign currency account should be established in the project for overseas procurement of documents and references. Special attention should be given to water resources texts, advice on the collection of which can be obtained from AID engineers. The Documentation Center should develop an information network with member state research institutions and consider publishing a newsletter to disseminate baseline study results.

b) Environmental Monitoring Laboratory - The consultant's report on development of this facility, using the equipment left behind by the Michigan group, should be given serious consideration, along with the advice of the Planning Unit's environmentalists. In planning for a continuing field program, however, careful attention should be given to the recurrent costs of operations. These do not fall under the purview of the project and a special case would have to be made for AID to finance any long-term environmental monitoring effort in the Basin. If it is decided to store the equipment for later use, this should be funded by the project; in this event, the environmentalist technical assistant should reconcentrate his work on analysis and synthesis.

c) Computers - Those being provided directly to OMVG and those to arrive at the completion of the Michigan studies should be housed and maintained under the supervision of the data base management expert. He or she should train OMVG staff in their use and develop the capacity in OMVG for running programs and data from additional sources, such as the ROSS and Clark Ross models.

d) Fiscal Allocation Responsibility Model - As with OMVS and at the appropriate time, this should probably be provided to OMVG as a tool for planning Member States' participation in major scheme development, financing and management. The need for it should be assessed in late 1985.

4. Map Storage and Access

The maps and aerial photographs produced by the project are such a major contribution that they deserve special attentionfor the preservation and optimization of their use, as follows:

a) The aerial photos and photomaps already delivered to OMVG should be moved immediately into a temporary holding room. This should be a separate, vacant room which has been well-scrubbed and cleaned, shuttered against sunlight, and totally enclosed and air conditioned. It should not be used for other purposes. Two staff members should be named as responsible for the photos and maps and the room. No future delivery of maps should be made until this controlled temporary storage has been assured by the OMVG.

c) The qualified Librarian/Documentalist to be immediately recruited should have, among other duties, permanent responsibility for the safekeeping and filing of the photos and maps. Each member state should also name the staff person who will be directly responsible for storing and filing their sets of photos and maps.

d) The project should immediately purchase a set of map files and associated map room equipment for OMVG and each member state.

e) AID should require and finance the construction or renovation of appropriate map rooms for the OMVG and each Member State. Preliminary plans should be drawn up with the responsible staff person and chief of service and include shelves, tables, shutters, weather seals, air conditioning and leakage/flooding protection. An AID Engineer should approve the plans and completed work.

e) AID should provide short-term technical assistance of a PASA map librarian from one of the several mapping agencies (USGS, DMA, Army Map Service, etc.) who would: set up the OMVG map room and files; train the OMVG documentalist; set up each Member State's map file; and train appropriate member-statepersonnel. Length of this service would be 2-3 months.

f) One complete set of the photomaps which have been delivered to the OMVG (and for the most part have not been unpacked) should be sent immediately to the UM/Harza Team for use in the final phase of the River Basin Study.

g) The project should finance a series of in-country photo and map interpretation seminars. These should be held in each member-stateand at OMVG for a 6-10 day period of afternoon sessions. The seminars should be conducted by an interdisciplinary, mixed panel of specialists with interpretation skills (livestock, water resources, demography/geography, forestry, etc.) and should consist of methods and techniques of photo/map interpretation used to obtain various types of sub-sectoral information. About 15-20 technical personnel directly involved in particular sub-sectoral analysis should be invited to participate in each seminar. The OMVG environmentalist should have a role in planning and organizing this.

h) Private study, consulting or engineering firms who are given sets of photos or maps should be required to pay a reasonable user's fee. These fees should be collected in a special fund set aside for photo/map storage, reorder, etc. The photomaps enable firms to realize significant savings in project study and OMVG and member-stateoperating budgets are limited and uncertain.

5. AID Project Management

a) As the time consuming studies are completed, AID project management should concentrate on OMVG integrative and planning activities through regular meetings with the Planning Unit, senior OMVG management staff and interested donors. In particular, UNDP, as the other donor supporting OMVG operations on a long-term basis, should be consulted with on a continuing basis, especially as concerns the further evolution of the project and the coordination of UNDP and AID assistance to the OMVG over the next 30 months.

b) AID should support OMVG in requesting timely financial support of OMVG from member states, both financial and in terms of seconded personnel.

c) Independently of OMVG staff, AID project managers should establish working relationships with members of the technical committees from member states on monitoring issues and evolution of the integrative exercise.

d) Member States should be requested to assign personnel trained on the job by Michigan and Mark Hurd to future monitoring and other relevant tasks in the Basin.

e) AID should refer the document concerning Guinea Bissau, "Terms of Reference for the Integrated Development of the Koliba-Corubal and Kayanga-Geba River Basins" to the Office of the AID Representative/Bissau, for consideration of support under the bilateral U.S. - Guinea Bissau aid program.

f) AID should speedily pursue negociations with OMVG on the evolution of the project as recommended above. As some indications of member-state support would be necessary, this make take some time; simultaneously other steps can and should be taken:

(1) The contract for long and short-term economic technical assistance should be negociated as soon as possible.

(2) Plans should be set afoot for map and lab equipment storage.

(3) A plan and proposal from Michigan should be solicited regarding any revised timing and use of resources for completion of the draft final report. (See II; above).

(4) A Project Paper Supplement following the guidance of AID Hand-book 3, Chapter 13 should be composed (with REDSO/WCA assistance as necessary) to be used as the basis for a ProAg Amendment.

Annex A

INDIVIDUALS CONTACTED

GOS

- Youssoupha Cisse - Ministere de la Protection de la Nature et de l'Environnement

- M. N'Diaye - Ministere de la Protection de la Nature et de l'Environnement

- Djibril Sall - Directeur des Amenagements et des Infrastructures Hydro-Agricoles

OMVG

- Gordon Appleby - Planning Unit

- Aboubacar Ba - Planning Unit

- Andre De Georges - Planning Unit

- Robert Demers- Technical Advisor

- Nassirou Diallo - Secretaire General

- Youssoupha Dibba - Planning Unit

- Malick John - High Commissioner

- Cheikh Hamidou Kane - Planning Unit

- M. Khouma - Agriculture Division

- Idrissa Samba - Planning Unit

USAID/BANJUL

- Binta Sidibe - Training Officer

USAID/DAKAR

- Lewis Lucke - RBDO, Project Officer

- David Hunsberger - RBDO, Deputy Project Officer

- Joel Schlesinger - Project Development Officer

- Vito Stagliano - RBDO Coordinator

UNIVERSITY OF MICHIGAN

- Peter Ames - Wildlife/Vegetation Team
- Thomas Berry - River Resources Team
- Judith Carney - Socio-economic Team
- Frank Casey - Socio-economic Team
- Bill Derman - Team Leader, Socio-economic Team
- John Dorr - Assistant Team Leader, River Resources
- Elon Gilbert - Project Coordinator
- Alice Hamer - Socio-economic Team
- Marc Healey - River Resources Team
- Jerry Krause - River Resources Team
- Karl Lagler - Chief of Party
- Len Malczynski - Data Management
- Russell Moll, Team Leader, River Resources
- Cynthia Moore - Socio-economic Team
- Robert Moran - Mining Expert
- Songthara Omkar - Administrative Officer
- Dario Rodriguez - Wildlife/Vegetation Team
- Christine Scharffenberger - Socio-economic
- Curt Schneider - Team Leader, Public Health
- Charles Steedman - Project Director
- Dean Treadwell - Wildlife Team
- Andree Wynkoop - Socio-economic Team

Socio-Economic Field Team

- Ousainu Baldeh - Supervisor
- Mamadou Barry - Interviewer

- Yukase Darbo - Interviewer
- A.Karim Diallo - Supervisor
- Fye Dembele - Interviewer
- Ibrahima Mall - Interviewer
- Moussa Wally - Supervisor

Trainees in River Resources Group

- Mamadou Cham
- Raymond Colley
- Cheikh Oumar Diallo
- Mussa Saidy Khan
- Amadou Gueye
- Papa Baidy Sy

Annex B

SELECTED BIBLIOGRAPHY

- AID files, Appleby

- AID files, Kjell Christophersen

- AID files, Michigan Correspondence

- AID files, PIO/P training

- David G. Le Marquand, International Rivers: The Politics of Cooperation, Vancouver, B.C. : Westwater Research Centre, University of British Columbia

- Environmental and Social Systems Analysts Ltd, review and Evaluation of Adaptive Environmental Assessment and Management, Vancouver 1982.

- Evaluation des donnees hydrologiques et meteologiques disponibles sur le basin du Fleuve Gambie, J.C. OHVRY, ORSTOM, Fevrier 1983.

- Fitch notes:

. From Demers, March 3, 1984

. From Lagler files, report on socio-economic team meetings 10/11-15/83

-GRBD, AID files, Socio-economic, Environmental studies, FY 1984

-Kekreti Reservoir Project, Agrar-UND Hydrotechnik

GMBH and Howard Humphries, Ltd, August 1983.

-Land use and water resources, H.C. Pereira, Cambridge University Press, 1973

-"Minutes from the third meeting of the OMVG Consultative Committee charged with following the environmental/socio-economic study of the GRB" March 15-17, 1984

-OMVG, Annual Activities Report, July 1980

-OMVG High Commission, "Presentation report of the Action Plan for Reinvestment" July 1984

-OMVG, Annual Activities Report, July 1980

-OMVG High Commission, "Presentation report of the Action Plan for Reinvestment", July 1984.

-OMVG, Project Paper, (625-0012) May 1981

-OMVG, Socio-economic files 1984

-PIO/T, January 1984

-Photogrammetry, Francis H. Moffitt, International Textbook Co., PA. 1961

-Project paper Amendment No. 1

-Quarterly Reports, Michigan

-"Reports of meeting, Ad Hoc Committee on the University of Michigan's work plan for Socio-economic and Environmental Studies", Dakar 10-14 May 1983

-Rhine Ruhr Ingenieur, GMBH, Final Design Studies of the Bridge Barrage at Balingo on the river Gambia, July 1982.

-Socio-economic Studies, Project paper

-Socio-economic Studies work plan from Senegal-Oriental IVS-UM, April-June, 1984

-Studies AID files FY 1982

- Thayer Scudder, "African River Basins", July 1981

- UM Contract, Socio-economic contract

- UM, GRBD/Socio-economic Study Overview, December 1982

- UM, list of working documents:

No. 1 Materials towards a bibliography related to Gambia Basin Development UM/GRBS, Banjul, 3 March 1983,

No. 2 Work plan for socioeconomic studies in relation to proposed dams in the Peoples Revolutionary Republic of Guinea by William Derman. UM/GRBS, Banjul, 3 March 1983,

No. 3 Criteria for selection of villages for intensive socio-economic study in The Gambia River Basin of The Gambia and Senegal by Peter M. Weil. UM/GRBS, Banjul, 23 February, 1983.

No. 4 Gambia River Basin Studies Work Plan. UM/GRBS, Ann Arbor, March, 1983, plus two addenda of later date

No. 5 Material towards an illustrated key to the fishes of the Gambia River and estuary by Walter J. Rainboth. UM/GRBS, Ann Arbor, May 1983,

No. 6 A review of data processing in requirements for socio-economics by Gerald A. Cole. UM/GRBS, Banjul, 20 June 1983,

No. 7 Guideline for fishery economic investigations by Henri Josserand. UM/GRBS, Banjul, 20 June 1983,

No. 8 Hydrology in relation to development in the Gambia River Basin by Michael Jasinski. UM/GRBS, Banjul, 31 July, 1983.

No. 9 Material on medical establishment in OMVG Member States by Sara McAndrew. UM/GRBS, Banjul, 30 July 1983.

No. 10 Socioeconomic reconnaissance Kedougou-Kekreti area, Senegal Oriental by Dr. William Derman. UM/GRBS, Banjul, 8 February, 1983.

No. 11 Proposed plan of study for a survey on the development and organization of irrigation perimeters in the Gambia River Basin by Christine Scharffenberger. UM/GRBS, Banjul, July, 1983.

No. 12 Program of reconnaissance for "Socioeconomic impact case study of the Balingo Barrage" and related "Agricultural Extension and input provision case study" by Cynthia Moore. UM/GRBS, Banjul, August, 1983.

No. 13 Work Plan for socioeconomic studies in the Kekreti Dam area, Senegal by Walter West. UM/GRBS, Banjul, July, 1983.

No. 14 Reconnaissance for socioeconomic downstream impact assessment of the Balingo Barrage by Cynthia Moore and Moussa Ceesay. UM/GRBS, Banjul, August, 1983.

No. 15 The design and relevance of intensive village surveys to river basin development project by John Sutter. UM/GRBS, Banjul, September, 1983.

No.16 Expanded materials on the study of hydrology in relation to development in the Gambia River Basin by Michael Jasinski. UM/GRBS, Banjul, September, 1983.

No. 17 Notes on involvement of the governments of the OMVG Member States in the Gambia River Basin Studies of the University of Michigan (UM/GRBS) for USAID and OMVG by Karl F. Lagler. UM/GRBS, Banjul, October 1983.

No. 18 Revised basin wide work schedules by team and project quarter by Karl F. Lagler. UM/GRBS, Banjul, November 15, 1983.

No. 19 Scope of animal health impact studies by Rinus Van den Ende. UM/GRBS, Banjul, September 26, 1983

No. 20 Flood plain ecology - Gambia River, the Gambia by Alfred M. Beeton. UM/GRBS, Banjul, January 18, 1984.

No. 21 Farming system survey in the Gambia River Basin between Georgetown vicinity, The Gambia, and Kedougou vicinity, Senegal-Oriental (Socioeconomic study zone 3) by Richard Swanson. UM/GRBS, Banjul, January 24, 1984.

No. 22 Farming survey in the Senegambia portion of The Gambia River Basin by Franklyn Casey, Cynthia Moore and Richard Swanson. UM/GRBS, Banjul, January 24, 1984.

No. 23 Gambia River "Balingo" bridge-barrage impacts study - rice cultivation systems by Judith Carney. UM/GRBS, Banjul, January 24, 1984.

No. 24 Artisanal fisheries of the Gambia River: Review and directives for University of Michigan Studies by John. A. Dorr III, Philip J. Schneeberger and Ousman K. L. Drammeh (Fisheries Department, Ministry of Water Resources and Environment), Banjul. UM/GRBS, Banjul, December, 1983.

No. 25 Aquatic ecology and resources of the Gambia River, Senegambia sampling strategy and selected findings, June through September, 1983 by Russell. A. Moll and John A. Dorr, III UM/GRBS, Banjul, January, 1984.

No. 26 Observations on the terrestrial flora, fauna and ecology of the Guinean headwaters region of the Gambia River Basin by Peter L. Ames, B. Dean Treadwell, Dario Rodriguez - Brejiarano and Janis A. Carter. UM/GRBS, Banjul, February 24, 1984.

No. 27 Snail intermediate host of human schistosomiasis in The Gambia and Senegal by Emile A. Malek. UM/GRBS, Banjul, 16 February 1984.

No. 28 Economic data on fisheries of the Gambia River and Adjacent Coastal Waters, by Henri P. Josserand, Mussa A. Saidykhan and Amadou A. Gueye. UM/GRBS, Banjul, February 20, 1984.

No. 29 Gambia River Basin Studies data processing and data management by Leonard Malczynski. UM/GRBS, Banjul, March 16, 1984.

No. 30 Socioeconomic impacts of proposed Kekreti dam, Gambia River, Senegal-Oriental by Walter West. UM/GRBS, Banjul, April 1, 1984.

No. 31 Costs of mitigating measures for Public Health in the Gambia River Basin, by Marty Makinen. UM/GRBS, Banjul, March 30, 1984.

No. 32 A dictionary of scientific and local names for fish commonly occurring in The Gambia's territorial waters by Mussa A. Saidykhan. UM/GRBS, Banjul, April 11, 1984.

- UM Proposal, Socio-economic Study

- UNDP, Development of the Gambia River Basin, Action Plan, June 1982

- UNDP, Development of the Gambia River Basin, Multidisciplinary multi-donor mission: Final mission report, Executive Summary/Chapter V April 1980

- USAID files training

- Workplan, Gambia River Basin Studies, UM + Harza, March 1983